Scientific Package of Practices (PoPs) for organic production of crops in cropping systems



ICAR-Network Project Organic Farming

ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut - 250 110 (UP) www.iifsr.res.in

Package of practice for organic production of crops in cropping systems

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Chhatisgarh

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Suggested cropping systems for organic production (based on testing under NPOF)

- 1. Soybean- Chickpea cropping system
- 2. Soybean-Onion cropping system
- 3. Rice-Chickpea cropping system

Details of Cropping Systems

1: Cropping System: Soybean- Chickpea cropping system

Particulars	Kharif	Rabi
Crop	Soybean	Chickpea
Fortnight of	Second fortnight of June	Second fortnight of October to
sowing/planting		first fortnight of November
Fortnight of	Second fortnight of October	Second fortnight of February to
harvesting		first fortnight of March
Varieties suitable for	JS-335	Vaibhav
organic farming		

Crop (kharif): Soybean

Important features of suitable varieties

important reactives of suitable varieties		
Parameters	JS-335	
Duration (days)	95-100	
Average yield under organic condition	1500-1800	
(kg/ha)		
Source (s) of availability	NSP – IGKV, Raipur	
Suitable regions/districts in the state	Kabirdham, Durg, Rajnandgaon, Bemetra, Raipur and	
	parts of Bilaspur districts.	
Specific resistance / tolerance to pest	Tolerance to stem fly	
Specific resistance / tolerance to	Resistance to bacterial pustule and tolerance to bud	
disease	blight	

Field preparation: One deep ploughing followed by two harrowing and planking.

Seed rate (kg/ha) (Not applicable	70-75		
for nursery crops)			
Pre-sowing/planting treatment of	Material	Recommended	Method of
seed/seedlings		rate (kg/ha or	application
		lit/ha)	
	Rhizobium	500 g/ha	Seed treatment
	culture		

	PSB	500 g/ha		Seed treatment
	Tricoderma	500 g/ha		Seed treatment
	viridi culture			
Spacing (Row X plant) in cm	30 X 10			
Basal application of organic	Source		Quantity/	ha
manures including soil	FYM		2 t/ha	
application of bio-fertilizers, bio-	Vermicompost		0.8 t/ha	
control agents etc	Neemcack		0.2 t/ha	
	Rock phosphate		0.27 t/ha	
Major weeds	Motha (Cyperus	spp.), Cra	ab grass (<i>D</i>	Digitaria sanguinalis),
	Jangali kodo –	Goose g	rass (Eleu	sine indica), Sava –
	Barnyard grass	(Echin	ochloa co	lona), Badi dudhi -
	Garden spurge (Euphorbia hirta), Dudhi - Milkwee			
	(Euphorbia geniculata), Hazardana – Seed-under-le		na – Seed-under-leaf	
	(Phylanthus niruri)			
Weed management	Critical stage of Recommended practice for organi		ractice for organic	
	weeding	condition	on	
	20-25 DAS Hand weeding and mechanical weed		I mechanical weeding	
		by cycle	e wheel ho	e
Organic plant protection practices	Name of	_	material	•
	pest/disease		ended for	litres/ ha)
		control		
	Tobacco		basiyana	<u> </u>
	caterpillar	SLNPV :	500 L.E.	2 ml/litre of water

Parameters	2004	2005	2006	2007	2008	2009	2010	2011	2012
Economic yield	1603	2385	2793	2448	1623	1556	1695	1081	1718
(kg/ha)									
Price* (Rs/kg)									
(consider 25 %	Rs 27.5	50							
premium on									
prevailing market									
price)									
Cost of	Rs. 225	585							
cultivation*(Rs/ha)									
Net returns*	Rs. 246	551							
(Rs/ha)									

^{*}based on prices of 2013-14

Crop (*Rabi*):Chickpea
Important features of suitable varieties

Parameters	Vaibhav
Duration (days)	110-115
Average yield under organic condition (kg/ha)	800-1000
Source (s) of availability	IGKV, Mega seed Project

Suitable regions/districts in the state	Chhattisgarh plains	
Specific resistance / tolerance to disease	Wilt resistance	

Field preparation: Ploughing through cultivator twice and planking

Cultural practices

Cultural practices				
Seed rate (kg/ha)	70-80			
Pre-sowing/planting treatment of	Material	Recomm	nended	Method of
seed/seedlings		rate (k	(kg/ha or application	
		lit/ha)		
	Rhizobium	0.5 kg		Seed treatment
	PSB	0.5 kg		Seed treatment
Spacing (Row X plant) in cm	30 X 10			
Basal application of organic	Source		Quantity/	ha
manures including soil	FYM		1.33 t/ha	
application of bio-fertilizers, bio-	Vermicompost		0.53 t/ha	
control agents etc	Neemcack		0.13 t/ha	
	Rock phosphate	;	0.27 t/ha	
Irrigation practices	Number of	Most	critical	Depth of irrigation
	irrigations	stages	for	(cm)
		irrigatio		
	2	Flower	_	2-3
		pod filling.		
Major weeds				dium album), Safed
				s alba), Krishna neel
	- Scarlet pipmpernel (Anagallis arvensis), Chinouri -			
	Medick (Medicago denticulate), Sava - Barnyard grass			
	(Echinochloa colona), Motha (Cyperus spp.)			
Weed management	_	cal stage of Recommended practice for organ		
	weeding	condition		
	25-30 DAS			nand hoe/cycle hoe
Organic plant protection	Name of		c material	Quantity (kg or
practices	pest/disease	recomn		litres/ ha)
		for con		
	Gram pod borer	HaNPV	7	250 LE/ha 3 spray
				at weekly interval.
		Trichog	gramma	50000 eggs/ha
		spp.		
		Pherom	one trap	5-8 nos.

Yield and Economics

Parameters	2004-05*	2005-06	2006-07	2007-08	2008-09
Economic yield (kg/ha)	770	1480	1090	610	957
Price (Rs/kg) (consider 25 % premium on prevailing market price)	25.00				
Cost of cultivation**(Rs/ha)	10091				
Net returns** (Rs/ha)	13828				

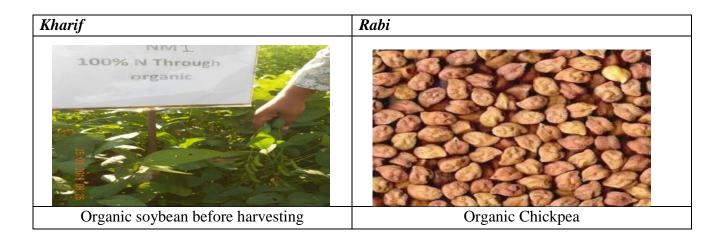
Glimpses







Kharif	Rabi
	Okoanio
Organic Soybean growth stage	Organic Chickpea pod setting stage



2. Cropping System: Soybean- Onion cropping system

Particulars	Kharif	Rabi
Crop	Soybean	Onion
Fortnight of	Second fortnight of June	First fortnight of December
sowing/planting		
Fortnight of	Second fortnight of October	First fortnight of April
harvesting		
Varieties suitable for	JS-335	Nasik red
organic farming		

Crop (Kharif): Soybean

Important features of suitable varieties

Parameters	JS-335	
Duration (days)	95-100	
Average yield under organic condition	1500-1800	
(kg/ha)		
Source (s) of availability	NSP – IGKV, Raipur	
Suitable regions/districts in the state	Kabirdham, Durg, Rajnandgaon, Bemetra, Raipur and	
	parts of Bilaspur districts.	
Specific resistance / tolerance to pest	Tolerance to Stem fly	
Specific resistance / tolerance to	Resistance to bacterial pustule and tolerance to bud	
disease	blight	

Field preparation: One deep ploughings followed by two harrowing and planking.

Seed rate (kg/ha) (Not applicable	70-75				
for nursery crops)					
Pre-sowing/planting treatment of	Material	Recomm	ended	Method of	
seed/seedlings		,	g/ha or	application	
		lit/ha)			
	Rhizobium	500 g/ha		Seed treatment	
	culture				
	PSB	500 g/ha		Seed treatment	
	Tricoderma	500 g/ha		Seed treatment	
	viridi culture				
Spacing (Row X plant) in cm	30 X 10				
Basal application of organic	Source		Quantity/ha		
manures including soil	FYM		2 t/ha		
application of bio-fertilizers, bio-	Vermicompost		0.8 t/ha		
control agents etc	Neem cake		0.2 t/ha		
	Rock phosphate 0.27 t/ha				
Major weeds	Motha (Cyperus spp.), Crab grass (Digitaria				
	sanguinalis), Jangali kodo – Goose grass (Eleusine				
	indica), Sava – Barnyard grass (Echinochloa colona),				
	Badi dudhi – G	arden spu	rge (Eupho	orbia hirta), Dudhi –	

	Milkweed (Euphorbia geniculata), Hazardana – Seed-			
	under-leaf (<i>Phyl</i>	anthus niruri)		
Weed management	Critical stage of Recommended practice for organ			
	weeding	condition		
	20-25 DAS	Hand weeding	and mechanical	
		weeding by cycle	wheel hoe	
Organic plant protection	Name of	Organic material	Quantity (kg or	
practices	pest/disease	recommended for	litres/ ha)	
	control			
	Tobacco	Baveriya	4 gm/litre of water	
	caterpillar	basiyana	2 ml/litre of water	
		SLNPV 500 L.E.		

Parameters	2004	2005	2006	2007	2008	2009	2010	2011	2012
	*								
Economic yield	1603	2385	2793	2448	1623	1556	1695	1081	1718
(kg/ha)									
Price** (Rs/kg)									
(consider 25 %	Rs 27.:	50							
premium on									
prevailing market									
price)									
Cost of	Rs. 22:	585							
cultivation*(Rs/ha)									
Net returns*	Rs. 24	651							
(Rs/ha)									

^{*}based on prices of 2013-14

Crop (Rabi) :Onion

Important features of suitable varieties

Parameters	Nasik Red
Duration (days)	100-110
Average yield under organic condition (kg/ha)	8000-12000
Source (s) of availability	Raipur Local Market
Suitable regions/districts in the state	Chhattisgarh plains

Nursery raising practices (if applicable)

Area of nursery required for 1 ha	500 m^2
Nursery raising method	raised bed method
Bed size (length X breadth in m)	5 X 1

Seed sowing rate/m ²	20 g			
Source and optimum quantity of	Materials	Quantity/	Method of application	
organic manures/other nutrient		m ² area		
source/m ² of nursery	Vermicompost	200 g	Soil incorporation	
	FYM	500 g	Soil incorporation	
Irrigation practices	First come up Irrigation after sowing and next 7			
	days interval			
Weed management	One hand weeding 25-30 days after sowing			
Optimum age of nursery (days)	40-45			

Field preparation: One deep ploughing followed by two harrowing and planking applied for field preparation.

Cultural practices

Spacing (Row X plant) in cm	15 X 10				
Number of seedlings/hill (in	1				
nursery crops only)					
Basal application of organic	Source		Quantity/ha		
manures including soil	FYM		5 t/ha		
application of bio-fertilizers, bio-	Vermicompost		2 t/ha		
control agents etc	Neem cake		0.5 t/ha		
	Rock phosphate		0.27 t/ha		
Irrigation practices	Number of	Most	critical	Depth of irrigation	
	irrigations	stages	for	(cm)	
		irrigatio			
	6-8	Format	ion of	3 - 4	
		bulb			
Major weeds	Amarbel - Dodder (Cuscuta spp), Bathua -				
	Lambsquarters (Chenopodium album), Choulai – Green				
	amarenth (Amaranthus viridis), Safed senji – White			ž.	
	,		* *	/a – Barnyard grass	
	,			(Cyperus spp.) and	
	Chanori – Medick (Medicago denticulate)				
Weed management			ecommended practice for organic		
			condition		
			and 45- Hand weeding and interculture		
	50 DAS				
Optimum stage of harvesting	100-110 days				

Yield and Economics

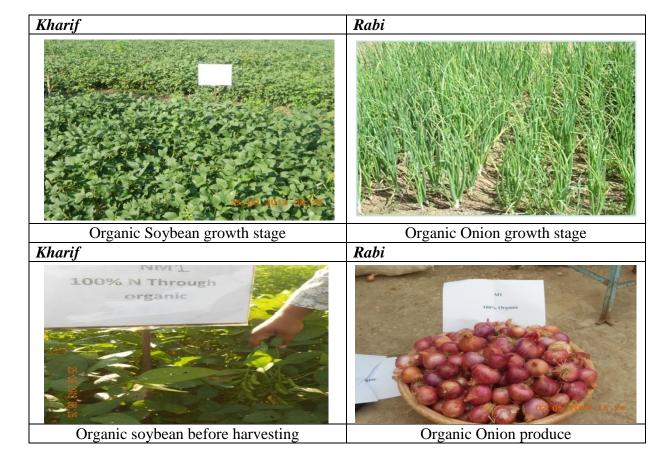
Parameters	2009-10*	2010-11	2011-12	2012-13
Economic yield (kg/ha)	9070	11800	13260	13170
Price (Rs/kg) (consider 25 % premium on prevailing market price)				

Cost of cultivation*(Rs/ha)	Rs. 37686
Net returns* (Rs/ha)	Rs.126902

^{*}based on prices of 2013-14

Glimpses





3. Cropping System: Rice-Chickpea cropping system

Particulars		Kharif	Rabi
Crop		Rice	Chickpea
Fortnight sowing/planting	of	Second fortnight of June	Second fortnight of November
Fortnight of harvesting		First fortnight of November	First fortnight of March
Varieties suitable organic farming	for	Kasturi and Sugundhmati	Vaibhav

Crop (kharif):Rice

Important features of suitable varieties

Parameters	Kasturi	Sugandhmati
Duration (days)	120-130	135-140
Average yield under organic condition	3500-4000	3500-4000
(kg/ha)		
Source (s) of availability	NSP, IGKV, Raipur	NSP, IGKV, Raipur
Suitable regions/districts in the state	Chhattisgarh Plain zone	Chhattisgarh Plain zone
Specific resistance / tolerance to pest	Stem borer tolerance	
Specific resistance / tolerance to disease	Blast resistance	

Nursery raising practices.

Area of nursery required for 1 ha	1000 m^2					
Nursery raising method	Raised bed method					
Bed size (length X breadth in m)	10 X 1					
Seed sowing rate/m ²	40 g					
Source and optimum quantity of	Materials	Quantity/	Method of application			
organic manures/other nutrient		m ² area				
source/m ² of nursery	Enriched	100 g	Soil application			
	compost					
	Cow dung	500 g	Soil application			
	manure					
	N.E.O.C. –	50 g	Soil application			
	Non edible					
	oil cake					
Irrigation practices	First come up irrigation after sowing and next 6					
	days interval					
Optimum age of nursery (days)	21-25 days					

Field preparation: Sowing of Sunhemp should be done during May month for green manuring purpose and incorporated in the field at vegetative stage around 40-45 DAS. For incorporation of the green manure impound the water in the field and after that plough the field twice and use rotavator once for proper incorporation and puddling.

Cultural practices

Cultural practices							
Spacing (Row X plant) in cm	20 X 10						
Number of seedlings/hill (in	2-3						
nursery crops only)							
Basal application of organic	Source		Quantit	Quantity/ha			
manures including soil	Enriched com	npost	6.6 t				
application of bio-fertilizers,	Cow dung ma		4.4 t				
bio-control agents etc		on edible oil ca	ke 0.88 t				
	Rock phospha		0.05 t				
Top dressing of organic manures	Source	Quantity/ha	Days sowing of crop	after/planting or stage			
				flowering stage			
	Panchagavv ya	50 litre	P.I. and	flowering stage			
Irrigation practices	Number of irrigations	Most critic stages irrigation	cal Depth of	of irrigation (cm)			
	5-6	Tillerig & gra	ain 5-7				
Major weeds	crus-galli) M day flower (ona, Echinochloa a keni – Benghal Resham Kanta – Kana – Creeping					
Weed management			Critical stage of Recommended practive weeding organic condition		1		
	20 DAT and interval there	•	nbika Paddy	weeder			
Organic plant protection practices	pest/disease	of Organic recommend control	material ded for	litres/ ha)			
	leaf folder	Neem oil		2 litres			

Yield and Economics

Tield that Economics				
Parameters	2009-10*	2010-11	2011-12	2012-13
Economic yield (kg/ha)	3550	4280	4260	4320
Price (Rs/kg) (consider 25 % premium	16			
on prevailing market price)				
Cost of cultivation*(Rs/ha)	31900			
Net returns*(Rs/ha)	43362			

^{*}based on prices of 2013-14

Crop (*Rabi*) : Chickpea
Important features of suitable varieties

Parameters	Vaibhav
Duration (days)	110-115
Average yield under organic condition (kg/ha)	800-1000
Source (s) of availability	IGKV, Mega seed Project
Suitable regions/districts in the state	Chhattisgarh plains
Specific resistance / tolerance to disease	Wilt resistance

Field preparation: Ploughing through cultivator twice and planking

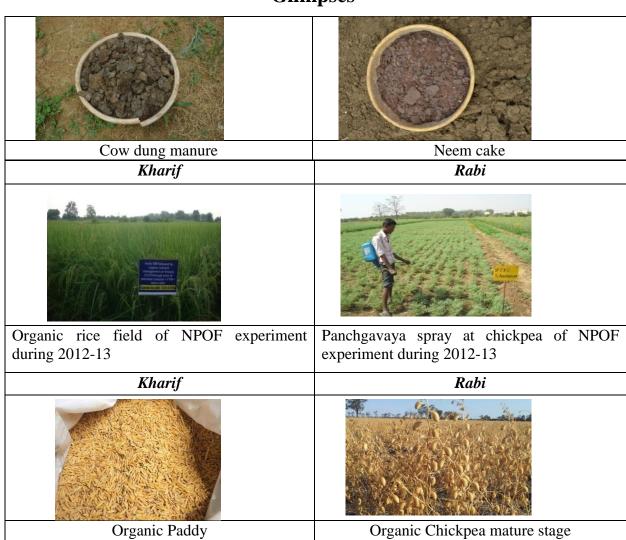
Seed rate (kg/ha)	70-80					
Pre-sowing/planting treatment of						
seed/seedlings		rate (k	kg/ha	application		
		lit/ha)				
	Rhizobium	0.5			Seed treatment	
	PSB 0.5 Seed treatment					
Spacing (Row X plant) in cm	30 X 10					
Basal application of organic	Source		Quanti	ity/ł	na	
manures including soil	Enriched compo	ost	1.66 t			
application of bio-fertilizers, bio-	Cow dung manu		1.11 t			
control agents etc	N.E.O.C. – No	on edible	0.22 t			
	oil cake					
	Rock phosphate	;	0.17 t			
Top dressing of organic manures	Source	Quantity	/ha I	Day	rs after	
					ing/planting or stage	
				of c	rop	
	Biodynamic				spray at flowering	
	preparation	litre wate	er s	stage in 15 days interva		
	Panchagavvya	50 litre	_	3 spray at flow		
					e in 10 days interval	
Irrigation practices	Number of	Most cr			th of irrigation (cm)	
	irrigations	stages	for			
		irrigation				
	2	flowering 2-3				
Major weeds		-	•	•	dium album), Safed	
	senji -White sweet clover (Melilotus alba), Krishna neel -					
					vensis), Chinouri -	
	,	0			va - Barnyard grass	
	(Echinochloa co					
Weed management				led practice for organic		
	weeding condition					
	25-30 DAS	_			and hoe/cycle hoe	
Organic plant protection	Name of		c materi	ial	Quantity (kg or	
practices	pest/disease	recomn			litres/ ha)	
		for con	trol			

Gram pod borer	HaNPV	250 LE/ha 3 spray
		at weekly interval.
	Trichogramma	50000 eggs/ha
	spp.	
	Pheromone trap	5-8 nos.

Parameters	2009-10*	2010-11	2011-12	2012-13
Economic yield (kg/ha)	1008	1210	1370	1270
Price (Rs/kg) (consider 25 % premium on prevailing market price)	32			
Cost of cultivation*(Rs/ha)	21622			
Net returns* (Rs/ha)	19045			

^{*}based on prices of 2013-14

Glimpses



Himachal Pradesh

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Suggested cropping systems (based on testing under NPOF)

- 1. Maize Garlic
- 2. Cauliflower Pea -Tomato
- 3. Coriander Pea -Tomato

Details of Cropping Systems (based on testing under NPOF)

Cropping System 1: Maize-Garlic

Particulars	Kharif	Rabi
Crop	Maize	Garlic
Fortnight of sowing/planting	June	October
Fortnight of harvesting	October	May
Varieties suitable for organic	Girija	GHC-1
farming		

Crop (kharif): Maize

Important features of suitable varieties

Parameters	Girija
Duration (days)	115
Average yield under organic condition (kg/ha)	4603
Source (s) of availability	CSK HPKV, Palampur
Suitable regions/districts in the state	Kullu, Mandi, Chamba
Specific tolerance to drought/water logging	Yes

Field preparation: Irrigate the field and then plough disc harrow and thereafter plough with power tiller twice and thereafter follow planking to maintain proper moisture in the field. Prepare plain beds and keep trenches in between and around the field for water drainage.

Seed rate (kg/ha) (Not	20-25	
applicable for nursery crops)		
Spacing (Row × plant) in cm	60 x 20	
Basal application of organic	Source	Quantity/ha
manures including soil	FYM	16 t
application of bio-fertilizers,	VC	12 t
bio-control agents etc	Rock phosphate	60 kg

Top dressing of organic manures	Source	Quantity/ha	Days after sowing/planting or stage of crop	
	Cow urine	60 L/600 L water/ha	30, 45, 60,90 DAS	
	Panchagavaya	18 L/600 L water/ha	60,90 DAS	
	Vermiwash	60 L/600 L water/ha	60,90 DAS	
Irrigation practices	Number of irrigations	Most critical stages for irrigation	Depth of irrigation (cm)	
	4-5	3-4 leaf stage, tasseling, grain filling etc.	4-5	
Major weeds	Local name	Common name	Scientific name	
	Doob grass	-	Cynadon dactylon	
	Motha	Purple nutsedge	Cyperus spefies	
	Baru	Johnson grass	Sorghum halepense	
	Jhanda	Water grass	Echinochloa	
			colonum	
Weed management	Critical stage of	Recommended	practice for organic	
	weeding	condition		
	4 leaf stage, 1	Manual		
	month after first			
	weeding and at taselling			
Organic plant protection	Name of	Organic	Quantity (kg or litres/	
practices	pest/disease	material	ha)	
		recommended		
		for control		
	Cut-worms	Through	4- 5 flood irrigations	
		cultural	and digging trench of	
		practices like	size 20 cm deep and	
		flood irrigation and formation	20 cm wide	
		trenches		
		around the		
		field		
Optimum stage of harvesting		vering turns brown	n and the moisture in	
	cobs is near 30%			

Parameters		2004-	2005-	2006-	2007-	2008-	2009-	2010-	2011-	2012-
		05*	06	07	08	09	10	11	12	13
Economic	yield	3143	2823	3030	3572	3800	5950	6018	5654	7440

(kg/ha)							
Price (Rs/kg)	12.50						
(consider 25 %							
premium on							
prevailing market							
price)							
Cost of	34090						
cultivation*(Rs/ha)							
Net returns* (Rs/ha)	58910		•	•	•	•	

^{*}based on prices of 2013-14

Crop (kharif): Garlic

Important features of suitable varieties

Parameters	GHC-1		
Duration (days)	220		
Average yield under organic condition (kg/ha)	8037		
Source (s) of availability	University		
Suitable regions/districts in the state	Kullu,	Mandi,	Solan,
	Shimla,Ka	ngra	
pecific tolerance to drought/water logging Drought resistant			

Field preparation: Irrigate the field to field capacity and then plough once with disc harrow and twice with power tiller and thereafter follow planking to maintain proper moisture in the field. Plain bed size is kept as land availability

Seed rate (kg/ha) (Not	500-600				
applicable for nursery crops)					
Spacing (Row × plant) in cm	20 x 10	20 x 10			
Recommended NPK and micro	N 125: P75: K 60				
nutrient dose for the crop	20 -25 kg/ha sulph	ate of each Fe, Zn,	Mn, Cu		
(kg/ha)			·		
Basal application of organic	Source Quantity/ha				
manures including soil	FYM 22 t				
application of bio-fertilizers,	VC 16 t				
bio-control agents etc	Rock phosphate	100 kg			
Top dressing of organic	Source	Quantity/ha	Days after		
manures			sowing/planting or		
			stage of crop		
	Cow urine	60 L/600 L	30, 45, 60,90, 120		
		water/ha	DAS		
	Panchagavaya	18 L/600 L	60,90, 120 DAS		
		water/ha			
	Vermiwash	60 L/600 L	60,90, 120 DAS		
		water/ha			
Irrigation practices	Number of	Most critical	Depth of irrigation		

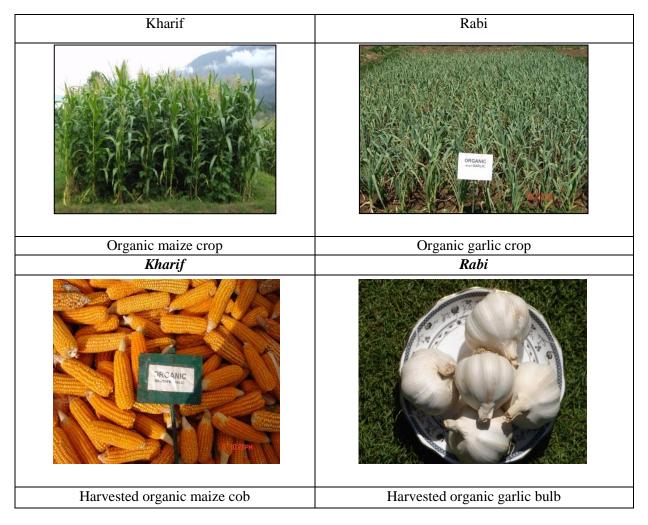
	irrigations	stages for irrigation	(cm)
	5-6	15 DAS, 3 leaf, initiation of clove formation, 30 days before	4-5
Major weeds	Local name	harvesting Common name	Scientific name
Wagor weeds	Jaldhar	Corn Butter Cup	Ranunculus arvensis
	Poa grass	Annual blue grass	Poa annua
	Maina/Khukhni	Bur clover	Medicago denticulate
Weed management	Critical stage of weeding	Recommended condition	practice for organic
	3 leaf, clove formation, 35 days before harvesting	Manual	
Organic plant protection practices	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ha)
	Purple Blotch	Cow urine+ Butter milk	30 L/300 L water/ha+30 L/300 L water/ha
	Stemphylium blight	Trichoderma viride + Pseudomonas fluorescence	0.30 gm/m ² each
Optimum stage of harvesting	When leaf colour c	hanges to yellow a	and starts drying

Parameters		2004-	2005-	2006-	2007-	2008-	2009-	2010-	2011-	2012-
		05	06	07	08*	09	10	11	12	13
Economic	yield	6082	4420	4600	9000	9640	9640	8644	10840	9450
(kg/ha)										
Price (F	Rs/kg)	31.25								
(consider 25	5 %									
premium	on									
prevailing n	narket									
price)										
Cost	of	52000								
cultivation*(Rs	s/ha)									

Net	returns*	243313
(Rs/ha)		

^{*}based on prices of 2013-14

Glimpses



Cropping System 2: Cauliflower-Pea-Tomato

Particulars	Kharif	Rabi	Summer
Crop	Cauliflower	Pea	Tomato
Fortnight of	August	November	May
sowing/planting			
Fortnight of	October	April	July
harvesting			
Varieties suitable for	Hybrid- Swati	Var. Azad-P1	Hybrid-7730
organic farming			

Crop (kharif): Cauliflower

Important features of suitable varieties

Parameters	Hybrid-Swati
Duration (days)	70
Average yield under organic condition (kg/ha)	8852
Source (s) of availability	Local Market
Suitable regions/districts in the state	Kullu and Mandi

Nursery raising practices (if applicable)

Area of nursery required for 1	30m ²					
ha						
Nursery raising method	Raised seed bed					
Bed size (length × breadth in	$3m \times 1m$					
m)						
Seed sowing rate/m ²	23g					
Pre-sowing seed/soil	Materials	Quantity/kg of	Method of application			
treatment		seed or per				
		m ² area				
	Nursery bed trea	Nursery bed treatment				
	Trichoderma	40 gm/m^2	Drenching/broadcasting			
	virde/					
	Trichoderma					
	harzianum					
	Plastic sheet	22 m^2	Soil solarisation			
	Seed treatment					
	Trichoderma	5 gm/kg of seed	Seed coating			
	virde					
	Pseudomonas	5 gm/kg of seed				
	fluorescence					

	Hot water		Seed soaking
	Treatment for		
	black rot		
Source and optimum quantity	Materials	Quantity/ m ² area	Method of application
of organic manures/other	T777. 6	~ 1	D 1 11 11
nutrient source/m ² of nursery	FYM	5 kg	Basal application
+	VC	2 kg	-do-
Irrigation practices	Watering can		
Weed management	Manual	<u> </u>	
Organic plant protection	Name of		Quantity/ m ² area
practices	pest/disease	organic material	
	D1: 1 //L C	used for control	0.20 / 2 1
	Blight/leaf spot	Trichoderma	$0.30 \text{ gm/m}^2 \text{ each}$
		virde +	
		Pseudomonas	
		fluorescence	
			2 2
	Black rot	Trichoderma	$0.30 \text{ gm/m}^2 \text{ each}$
		virde +	
		Pseudomonas	
		fluorescence	
			2
	Curd rot	Trichoderma	$0.30 \text{ gm/m}^2 \text{ each}$
		virde +	
		Pseudomonas	
		fluorescence	
Optimum age of nursery	38		
(days)			

Field preparation: The field is irrigated and then plough once with disc harrow and thrice with power tiller to bring soil in to good tilth. The bed size is kept as per convenience.

Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application
	Seedling treatment	t	
	Trichoderma virde	3kg/ha	Root dip
	Pseudomonas fluorescence	3kg/ha	Root dip
Spacing (Row × plant) in cm	60 × 45		
Number of seedlings/ kanal (400m ²)	1480		

Basal application of organic	Source		Quantity	/ha	
manures including soil	FYM				
application of bio-fertilizers,	VC	16 t			
bio-control agents etc	Rock phosphate		100 kg/h	a	
Top dressing of organic	Source	Quantity	//ha	Days after	
manures				sowing/planting or	
				stage of crop	
	Cow urine	60 L		15, 30, 45, 60 DAT	
	Panchagavya	18L		30, 45, 60 DAT	
	Vermi wash-10%		/600 L	30, 45, 60 DAT	
T	NI 1 C	water/ha		D 4 C ::	
Irrigation practices	Number of	Most	critical	1	
	irrigations	stages irrigation	for n	(cm)	
	4-5	•	anting and	4-5 cm	
		curd for		1 0 000	
Major weeds	Local name	Commo		Scientific name	
	Jhanda	Water grass		Echinochloa	
		77.11		colonum	
	Chhoti Jhan	Yellow foxtail		Setaria glauca	
	Motha	Purple nutsedge		Cyperus sp.	
	Ragi/Mandal	Goose grass Eleus		Eleusine indica	
Weed management	Critical stage of	Recommended practice for organic			
	weeding	condition			
	2-3 (4 leaf stage,	Manual			
	2 times before				
	curd formation)			2 (1 11. (
Organic plant protection	Name of	Organic material		Quantity (kg or litres/	
practices	pest/disease			na)	
		recommended for control			
	1.Lepidopeterus	Delta			
	larvae		•		
		DBM			
		(Diamor	nd		
		Back	Moth)		
		lure t	o be		
		installed	l		
		immedia	ately		
		after	.		
	2 4 -1-11	transpla			
	2.Aphids	No need			
		populati			
		remains Econom			
		Injury L			
Optimum stage of harvesting	When curds become			proper shape	
Optimum stage of harvesting When curds become compact and gain proper shape					

(in	1	case	of	vegetables	and
ree	ee	n cob)		

Parameters	2007-	2008-	2009-	2010-	2011-	2012-
	08*	09	10	11	12	13
Economic yield (kg/ha)	10670	9660	8330	9523	7570	7360
Price (Rs/kg) (consider 25 % premium	8.00					
on prevailing market price)						
Cost of cultivation*(Rs/ha)	34738					
Net returns* (Rs/ha)	24142					

^{*}based on prices of 2013-14

Crop (Rabi): Pea

Important features of suitable varieties

Parameters	Azad P-1
Duration (days)	140
Average yield under organic condition (kg/ha)	8941
Source (s) of availability	Deptt. of Agriculture
Suitable regions/districts in the state	Kullu

Field preparation: Irrigate the field to field capacity and then plough once with disc harrow and twice with power tiller and thereafter follow planking to maintain proper moisture in the field. Plain bed size is kept as land availability

Seed rate (kg/ha) (Not	75		
applicable for nursery crops)			
Pre-sowing/planting	Material	Recommended rate	Method of
treatment of seed/seedlings		(kg/ha or lit/ha)	application
	Soil treatment		
	Trichoderma	3.75 kg/ha	Broadcast
	virde		
	Seed Treatment		
	Trichoderma	3.75 kg/ha	Seed coating of
	virde		each
	Pseudomonas	3.75 kg /ha	
	fluorescence		
Spacing (Row X plant) in cm	60 X 10		
Basal application of organic	Source	Quantity/ha	

manures including soil	FYM	4.34t		
application of bio-fertilizers,	VC	3.2t		
bio-control agents etc	Rock phosphate	87kg		
Top dressing of organic	Source	Quantity/ha	Days after	
manures			sowing/planting or	
			stage of crop	
	Cow urine	60L	30, 45, 60 DAS	
	Panchagavya	18L	30, 45, 60 DAS	
	Vermi wash- 10%	60 L/600 L water/ha	30, 45, 60 DAS	
Irrigation practices	Number of	Most critical stages	Depth of irrigation	
	irrigations	for irrigation	(cm)	
	2-3	Seed germination,	4-5cm	
		flowering and pod		
		formation		
Major weeds	Local name	Common name	Scientific name	
	Jaldhar	Corn Butter Cup	Ranunculus	
			arvensis	
	Poa grass	Annual blue grass	Poa annua	
	Maina/Khukhni	Bur clover	Medicago	
			denticulate	
	TZ ' 1 1	0 1	A 11:	
	Krishan neel	Scarlet pimpernel	Anagallis arvensis	
Wood management	Khokhua	Chick weed	Stellaria media	
Weed management	Critical stage of	Recommended practice for organ condition		
	weeding 1.After 3-	Manual		
	4weeks of	Manual		
	sowing			
	2.Before			
	flowering			
Organic plant protection		Organic material	Quantity (kg or	
practices	pest/disease	recommended for	litres/ ha)	
		control	,	
	Ascochyta	Trichoderma virde +	3kg/ha each	
	blight	Pseudomonas		
		fluorescence		
	Powdery	Ginger, Garlic and	1.25 kg/ha ginger,	
	mildew	Chilli Extract	2.5 kg/ha garlic,	
			1.25 kg/ha chilli	
	Powdery	Trichoderma virde +	3kg/ha each	
	mildew	Pseudomonas		
		fluorescence		
		·		
Optimum stage of harvesting	When Pea pods a	ttain dark green colour		
(in case of vegetables and				
green cob)				

Parameters	2007-	2008-	2009-	2010-	2011-	2012-13
	08*	09	10	11	12	
Economic yield (kg/ha)	10820	11290	5230	7420	10185	8700
Price (Rs/kg) (consider 25 %	25					
premium on prevailing market						
price)						
Cost of cultivation**(Rs/ha)	52845					
Net returns** (Rs/ha)	164655					
						ļ

Crop (Summer): Tomato

Important features of suitable varieties

Parameters	Hybrid- 7730
Duration (days)	85
Average yield under organic condition (kg/ha)	10410
Source (s) of availability	Department of Agriculture
Suitable regions/districts in the state	Kullu, Mandi, Kangra, Solan
Specific resistance / tolerance to pest	No
Specific resistance / tolerance to disease	Bacterial wilt
Specific tolerance to drought/waterlogging	No

Nursery raising practices:

Area of nursery required for	30 m^2				
1 ha					
Nursery raising method	Raised seed bed				
Bed size (length X breadth	3m X 1 m				
in m)					
Seed sowing rate/m ²	15 g				
Pre-sowing seed/soil	Materials	Quantity/kg of	Method of		
treatment		seed or per	application		
		m ² area			
	Seed Treatment				
	Trichoderma virde	5 gm/kg each	Seed coating		
	Pseudomonas				
	fluorescence				
	Nursery bed Treatment:				
	Trichoderma virde /	40 gm/m^2	Drenching/		
	Trichoderma harzianum		broadcasting		
	Plastic sheet	30m^2	Soil solarisation		
	Seedling Treatment				
	Trichoderma virde	0.30 g/m^2	Root dip		
	Pseudomonas	each			

	fluorescence		
Source and optimum	Materials	Quantity/	Method of
quantity of organic		m ² area	application
manures/other nutrient	FYM	2 kg	Basal application
source/m ² of nursery	VC	1 kg	-do-
Irrigation practices	Watering can		
Weed management	Manual		
Organic plant protection	Name of pest/disease	Recommended	
practices		organic materia	al m ² area
		used for contro	1
	Blights/leaf spots/fruit	Trichoderma	0.30 gm/m^2
	rots	virde+	each
		Pseudomonas	
		fluorescence	
	Wilt/root/collar rot	Trichoderma	3.75kg/m^2
		virde as soil	
		treatment	
	Wilt/root/collar rot	Trichoderma	0.30 gm/m^2
		virde +	each
		Pseudomonas	
		fluorescence as	
		foliar spray	
Optimum age of nursery (days)	32		

Field preparation: The field is irrigated and then plough once with disc harrow and thrice with power tiller to bring soil in to good tilth. The bed size is kept as per convenience. Proper trenches around the field are formed for drainage of excess water.

Note: The land holding in the state is generally small and it is difficult to use tractor for ploughing. In such situation, the ploughing may be done preferably with bullocks or power tiller.

Pre-sowing/planting treatment of seed/seedlings (only using organic inputs	Material	Recommended rate (kg/ha or lit/ha)	Method of application
such as bio-fertilizer, bio- control agents, cow urine, panchagavya etc)	Trichoderma viride+ Pseudomonas flourosence	3.75kg/ha each	Basal application
Spacing (Row X plant) in cm	60 X 45		
Number of seedlings/ kanal (400m ²)	1480		

Basal application of organic			Quantity/ha		
manures including soil	FYM		17.4 t		
application of bio-fertilizers,	VC		12.8 t		
bio-control agents etc	RP		100 kg		
Top dressing of organic manures	Source	Quanti	ty/ha	Days after sowing/planting or stage of crop	
	Cow urine	60 L water/h	/600 L	15, 30, 45, 60 DAT	
	Panchagavya	18L	Iu	15, 30, 45, 60 DAT	
	Vermiwash		/600 L na	15, 30, 45, 60 DAT	
Irrigation practices	Number of irrigations	of Most stages irrigati	critical for on	Depth of irrigation (cm)	
	3-4	Transp floweri fruit se	0	4-5	
Major weeds	Local name		on name	Scientific name	
	Kulfa	Purslar		Portulaca oleracea	
	Tipatia/khatibu			Oxalis latifolia	
	Poa grass	Annual grass	blue	Poa annua	
	Peeli buti	-		Gallinsoga parviflora	
Weed management	Critical stage of	of Recom		practice for organic	
	weeding After 2-3 week				
	of transplantin		1		
	and thereafte				
	45 and 60 DAT				
Organic plant protection practices			material	Quantity (kg or litres/	
S. I.	pest/disease	recommen		ha)	
	Fruit borer	i)Lipel/Dipe	el	Lipel @1.0 kg/ha or	
		(Bacillus		Dipel 1.0 L/600 L/	
		thuringie kurstaki)	-	water/ha	
		ii)Neemba		3L/600 L water/ ha	
		iii)Margos		0.6L/600 L water/ ha	
		(Azedarch			
		iv) *Dare	`	3L/600 L water/ ha	
		azedarach)			
		(Roylea ci	nerea) or basuti		
		(Eupatoriu			
		aqueous le			
		+ cow ur	ine 3% +		
		emulsifier 100 (0.05%			

Optimum stage of harvesting	When ¼ th lower part of tomato fruit turns red.
opinion stage of har vesting	White is the part of tollians from

Parameters	2007-	2008-	2009-	2010-	2011-	2012-
	08	09	10	11	12	13
Economic yield (kg/ha)	14970	15620	18580	1993	3700	7600
Price (Rs/kg) (consider 25 % premium	18.75					
on prevailing market price)						
Cost of cultivation*(Rs/ha)	55025					
Net returns* (Rs/ha)	142500			•		

^{*}based on prices of 2013-14

Glimpses

Kharif	Rabi	Summer
Organic cauliflower crop	Organic green pea crop	Organic tomato crop
Kharif	Rabi	Summer
III.III	Oncount.	
Organic cauliflower curds	Organic green pods	Organic tomato fruits

Cropping System 3: Coriander- Pea-Tomato

Particulars	Kharif	Rabi	Summer
Crop	Coriander	Pea	Tomato
Fortnight of	August	November	May
sowing/planting			
Fortnight of	September	April	July
harvesting			
Varieties suitable for	Mediterranea-	Azad-P1	Hybrid-7730
organic farming	Hybrid		

Crop (kharif): Coriander

Important features of suitable varieties

Parameters	Mediterranea- Hybrid
Duration (days)	91
Average yield under organic condition (kg/ha)	5717
Source (s) of availability	Local Market
Suitable regions/districts in the state	Kullu

Field preparation: Irrigate field and then plough once with disc harrow and thrice with power tiller to bring soil in to fine tilth. Plain beds are made keeping bed size as per convenience.

Seed rate (kg/ha)	20 kg					
Spacing (Row × plant) in cm	30 x 5					
Basal application of organic	Source		Quantity/ha	ıtity/ha		
manures including soil	FYM		13 t			
application of bio-fertilizers,	VC		8 t			
bio-control agents etc	Rock phosphate		65 kg/ha			
Top dressing of organic manures	Source	Quantity/ha		Days after sowing/planting or stage of crop		
	Cow urine	60 L		30, 45, 60 DAS		
	Bio dynamic 2.5 g/40 L/ha (501)		45 and 60 DAS			
	Panchagavya	18L		30, 45, 60 DAS		
Irrigation practices	Number of	Most cr	ritical stages	Depth of		
	irrigations	for irrig	gation	irrigation (cm)		
	5-6	-		4-5 cm		
Major weeds	Local name	Commo	on name	Scientific name		
	Jhanda	Water grass		Echinochloa		
				colonum		
	Chhoti Jhan	Yellow foxtail Setaria glaud		Setaria glauca		
Weed management	Critical stage of	e of Recommended practice for		ctice for organic		
	weeding	condition	on			

			2-3		Manual		
Organic	plant	protection		of	•	Quantity (kg or	
practices			pest/disease		recommended for	ntres/ na)	
					control		
			No insect-pes	t pı	oblem found, hence	no need of plant	
			protection prac	ctice	S		
Optimum	stage of h	narvesting	After 4-5weeks, twice at 15-20 days interval				

Parameters	2009-10*	2010- 11*	2011- 12*	2012- 13*
Economic yield (kg/ha)	6396	9523	3512	6596
Price (Rs/kg) (consider 25 % premium on prevailing market price)	12.50		•	·
Cost of cultivation*(Rs/ha)	25140			
Net returns* (Rs/ha)	57310			

^{*}based on prices of 2013-14

Crop (Rabi): Pea

Important features of suitable varieties

Parameters	Azad P-1
Duration (days)	140
Average yield under organic condition (kg/ha)	5956
Source (s) of availability	Deptt. of Agriculture
Suitable regions/districts in the state	Kullu

Field preparation: Irrigate field and then plough once with disc harrow and thrice with power tiller to bring soil in to fine tilth. Plain beds are made keeping bed size as per convenience.

Seed rate (kg/ha) (Not applicable for nursery crops)	75		
Pre-sowing/planting	Material	Recommended rate	Method of
treatment of seed/seedlings		(kg/ha or lit/ha)	application
	Soil treatment:		
	Trichoderma	3.75 kg/ha	Broadcast
	virde		
	Seed Treatment	<u>.</u>	
		T.	
	Trichoderma	3.75 kg/ha	Seed coating of
	virde		each

	Pseudomonas fluorescence	3.75 kg /ha					
Spacing (Row X plant) in cm	60 X 10						
Basal application of organic	Source	Quantity/ha	Quantity/ha				
manures including soil	FYM	4.34t					
application of bio-fertilizers,	VC	3.2t					
bio-control agents etc	Rock phosphate	87kg					
		0.1-26					
Top dressing of organic manures	Source	Quantity/ha	Days after sowing/planting or stage of crop				
	Cow urine	60L	30, 45 and 60 DAS				
	Bio dynamic (50	1) 2.5 g/40 L/ha	45 and 60 DAS				
	Panchagavya	18L	30, 45 and 60 DAS				
Irrigation practices	Number	of Most critical	Donth of imigation				
Irrigation practices			Depth of irrigation				
	irrigations	stages for	(cm)				
	2-3	irrigation	4-5cm				
	2-3	Seed germination,	4-3CIII				
		flowering and pod formation					
Major woods	Local name		Scientific name				
Major weeds		Common name	Ranunculus				
	Jaldhar	Corn Butter Cup	arvensis				
	Poa grass	Annual blue grass	Poa annua				
	Maina/Khukhni	Bur clover	Medicago				
	Mama/Knukiiii	Bur clover	denticulate				
	Krishan neel	Scarlet pimpernel	Anagallis arvensis				
	Khokhua	Chick weed	Stellaria media				
Weed management	Critical stage weeding	of Recommended pra	actice for organic				
	1.After 3-4wee	eks Manual					
	of sowing 2.Before flowering	ng					
Organic plant protection	Name	of Organic material	Quantity (kg or				
practices	pest/disease	recommended for control	litres/ ha)				
	Ascochyta blight	Trichoderma virde + Pseudomonas fluorescence	3kg/ha each				
	Powdery mildew	Ginger, Garlic and Chilli Extract	1.25 kg/ha ginger, 2.5 kg/ha garlic, 1.25 kg/ha chilli				

	Trichoderma virde 3kg/ha each + Pseudomonas fluorescence			
Optimum stage of harvesting	When Pea pods attain dark green colour			

Parameters	2009-10	2010-11	2011-12	2012-13
Economic yield (kg/ha)	6485	5941	7150	4248
Price (Rs/kg) (consider 25 % premium on	25			
prevailing market price)				
Cost of cultivation*(Rs/ha)	52845			
Net returns* (Rs/ha)	53355			

^{*}based on prices of 2013-14

Crop (Summer): Tomato

Important features of suitable varieties

Parameters	Hybrid- 7730
Duration (days)	85
Average yield under organic condition (kg/ha)	11151
Source (s) of availability	Department of Agriculture
Suitable regions/districts in the state	Kullu, Mandi, Kangra, Solan
Specific resistance / tolerance to pest	No
Specific resistance / tolerance to disease	Bacterial wilt
Specific tolerance to drought/waterlogging	No

Nursery raising practices

Area of nursery required	30 m^2				
for 1 ha	30 m				
Nursery raising method	Raised bed method				
Bed size (length X	3m X 1 m				
breadth in m)					
Seed sowing rate/m ²	15 g				
Pre-sowing seed/soil	Materials	Quantity/kg of	Method of		
treatment	seed or per application				
(only using organic inputs	m ² area				
such as bio-fertilizer, bio-	Seed Treatment :				
control agents, cow urine,	Trichoderma virde 5 gm/kg each Seed coating				
panchagavya etc)	Pseudomonas fluorescence				
	Nursery bed Treatment:				
	Trichoderma virde /	40 gm/m^2	Drenching/		
	Trichoderma harzianum		broadcasting		
	Plastic sheet	30m^2	Soil solarisation		

	Seedling Treatment:			
	Trichoderma virde	0.30 g/m^2	Root dip	
	Pseudomonas fluorescence	each		
Source and optimum	Materials	Quantity/ m ² area	Method of	
quantity of organic		m ² area	application	
manures/other nutrient	FYM	2 kg	Basal application	
source/m ² of nursery	VC	1 kg	-do-	
Irrigation practices	Watering can			
Weed management	Manual			
Organic plant protection	Name of pest/disease	Recommended	Quantity/	
practices		organic materia		
		used for control		
	Blights/leaf spots/fruit rots	Trichoderma	0.30 gm/m^2	
		virde +	each	
		Pseudomonas		
		fluorescence		
	Wilt/root/collar rot	Trichoderma	3.75kg/m ²	
		virde as soil		
		treatment		
		Trichoderma	0.30 gm/m^2	
		virde +	each	
		Pseudomonas		
		fluorescence as		
		foliar spray		
Optimum age of nursery (days)	32			

Field preparation: Irrigate field and then plough once with disc harrow and thrice with power tiller to bring soil in to fine tilth. Plain beds are made keeping bed size as per convenience. For proper water drainage, trenches are made around the field.

Pre-sowing/planting treatment of seed/seedlings	Material	Recomm	ended g/ha or	Method application	of
(only using organic inputs such		lit/ha)	g/IIa OI	аррисацоп	
as bio-fertilizer, bio-control agents, cow urine, panchagavya	Trichoderma	3.75kg/h	a each	Basal application	
etc)	viride+				
(cic)	Pseudomonas				
	flourosence				
Spacing (Row X plant) in cm	60 X 45				
Number of seedlings/ kanal	1480				
(400m^2)					
Basal application of organic	Source		Quantity/	ha	
manures including soil	FYM	17.38t			
application of bio-fertilizers,	VC	12.8t			
bio-control agents etc	RP	100kg			

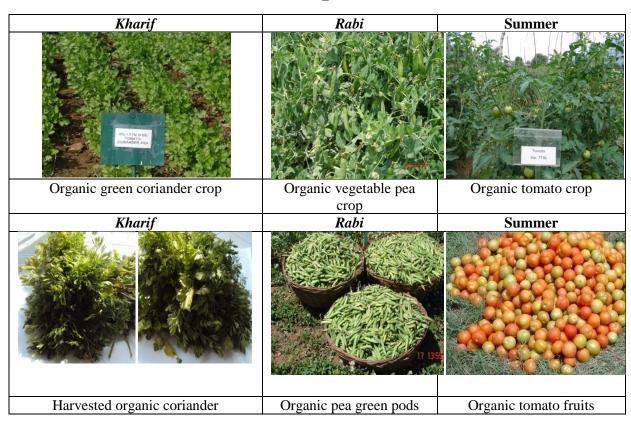
Top dressing of organic manures	Source	Quantity/ha	Days after sowing/planting or stage of crop	
	Cow urine	60 L	15, 30, 45, 60 DAT	
	Bio dynamic (501)		45 and 60 DAT	
	Panchagavya	18L	15, 30, 45, 60 DAT	
	Vermiwash	10 L	30, 45, 60 DAT	
Irrigation practices	Number of	Most critical	Depth of irrigation	
	irrigations	stages for	(cm)	
		irrigation		
	3-4	Transplanting,	4-5	
		flowering and		
36: 1	T 1	fruit setting	G : 1:C.	
Major weeds	Local name Kulfa	Common name Purslane	Scientific name Portulaca oleracea	
	Tipatia/khatibuti		Oxalis latifolia	
	Tipatia/Kiiatibuti	wood sollel	Oxalis lalijolla	
	Poa grass	Annual blue	Poa annua	
	1 ou gruss	grass	1 oa annua	
	Peeli buti	-	Gallinsoga	
			parviflora	
Weed management	Critical stage of	1 0		
	weeding	condition		
	After 2-3 weeks			
	of transplanting			
	and thereafter 45			
	and 60 DAT			
Organic plant protection		Organic material	Quantity (kg or	
practices	1	recommended for control	litres/ ha)	
		Lipel/Dipel	Lipel @1.0 kg/ha or	
		(Bacillus	Dipel 1.0 L/ha	
		thuringiensis sp.	Diper 1.0 L/ma	
		kurstaki)		
	j	ii)Neemban(0.15%)	3L/ ha	
	j	iii)Margosom	0.6L/ ha	
		(Azedarchtin 1.0%)		
		iv) *Darek (Melia	3L/ ha	
		azedarach) or		
		Karvi (Roylea		
		cinerea) or kali		
		basuti		
		(Eupatorium) 5% aqueous leaf		
		aqueous leaf extract + cow urine		
		3% + emulsifier		
		TritonX-100		
		111.011/1 100		

		(0.05%)	
Optimum stage of harvesting	When ¼ th lower	part of tomato fruit to	ırns red.

Parameters	2009-10	2010-11	2011-12	2012-13
Economic yield (kg/ha)	24635	8086	3328	8555
Price (Rs/kg) (consider 25 % premium on	18.75			
prevailing market price)				
Cost of cultivation*(Rs/ha)	55025			
Net returns* (Rs/ha)	105381			

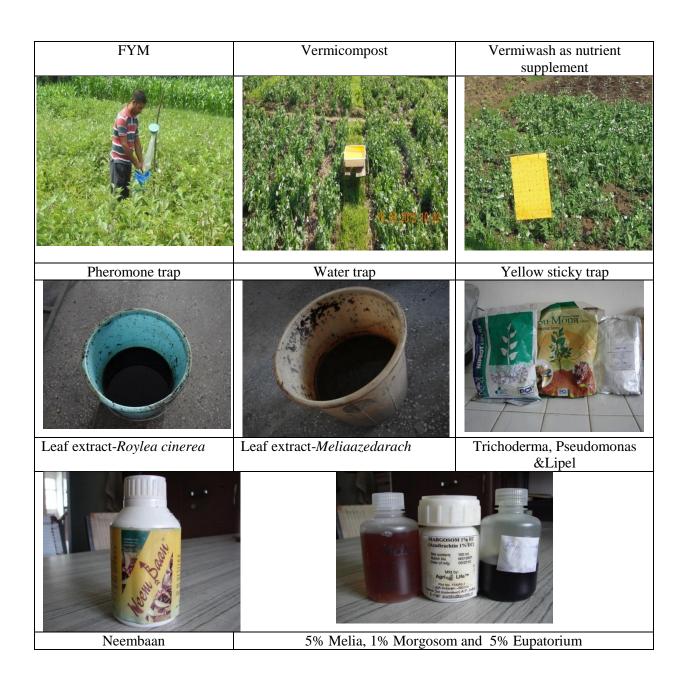
^{*}based on prices of 2013-14

Glimpses



Glimpses (Photos) of Organic Production





Details of Specific Practices/products used/recommended

Practice	Method Product	Method
Seed treatment for	Trichoderma virde +	Make a paste or slurry of each adding 5
direct seeded crops	Pseudomonas	g in 10-20 ml of water or rice gruel.
	fluorescence	Pour 1kg of seed on to the paste or
		slurry and mixed properly to coat the
		seeds uniformly. Dry coated seeds for
		20-30 minutes before sowing.
Nursery bed treatment	Trichoderma virde /	Prepare a suspension by adding 40 g in
for transplanted crops	Trichoderma	10 litres of water and drench the nursery
	harzianum	bed soil. Mix 250 g in 2 kg cow dung /
		compost/FYM and spread over nursery
		bed and irrigate.
Soil Solarisation for	Plastic sheet	Solarisation is a simple, four-step

1 1	T	
disease control		process, Stapleton says.
		Step one: Cultivate the soil, and collect
		and dispose of dead plants and other
		debris that might harbor pests.
		Step two: Level and smooth the soil
		surface.
		Step three: Irrigate the soil very well to
		at least 12 inches deep to increase its
		heat conductivity.
		Step four: Lay a clear plastic sheet on
		the soil surface. (25 micron plastic sheet
		works well). Anchor the edges of the
		sheet with soil. The closer to the soil
		surface the plastic is, the better the
		heating. Remove the sheet after 4 to 6
		weeks and resume nursery raising. Do
		solarisation during summer for effective
		<u> </u>
		control of soil born diseases like wilt and
5.		damping off.
Disease control (Trichoderma virde +	Make a paste by adding 10 g in 15 ml
cauliflower blight/leaf	Pseudomonas	water and then add the paste to 1 litre of
spot) using bio-agents	fluorescence	water. Mixed properly before spraying
		on the plant parts.
		Spray during evening and repeat the
		sprays after 7- 10 days interval
		considering disease severity. It is
		effective for reducing blight/leaf spot
		disease of cauliflower
D 1		
Panchagavya as	Cow dung, Cow urine,	Mix cow dung (10 kg) and cow
nutrient supplement	Cow ghee, Milk, Curd,	ghee (1 kg). After 3 days add all other
and disease control	Gur, Ripened banana,	contents (cow urine 10L, milk 3 L, curd
	Yeast	3 L, gur 250 g, ripened banana 12 nos.,
	(Use cow dung, ghee,	yeast 100 g). Ferment for 15 days. Filter
	curd, urine of local	the contents. Use @ 2-5% solution as
	cow)	foliar spray.
		Note: Spray during evening and repeat
		the sprays after 7- 10 days interval
		± *
D' 1 '	D: 1 : 501	considering disease severity.
Biodynamic as	Biodynamic-501	BD 501 is "cow horn silica" and is made
nutrient supplement	formulation	form quartz crystals ground to talcum
		power consistency, stuffed into a cow
		horn, buried during spring equinox, and
		taken out during autumn equinox. The
		material, stored in glass bottle, and
		exposed to the sun by the windowsill is
		used to prepare the BD 501 spray
		solution by dissolving 2.5 g in 40 L of
		water. Within an hour, the mixture is sprayed as a fine mist on the plant

		foliage (i.e., before 9.00 a.m.) either based on biodynamic calendar (when moon was opposite to Saturn in the biodynamic calendar) or applied at 30 and 60 days after transplanting.
Disease control through hot water seedling treatment	Hot water	Heat water at 52 °C and soak seeds for 30 minutes before sowing for effective control of black rot of cauliflower
Disease control of cauliflower curd rot/ Powdery mildew in pea/ Ascochyta blight	Trichoderma virde + Pseudomonas fluorescence	Make a paste by adding 10 g in 15 ml water and then add the paste to 1L of water. Mixed properly before spraying on the plant parts. Spray during evening and repeat the sprays after 7- 10 days interval considering disease severity for effective control of curd rot of cauliflower.
Ginger, Garlic and Chilli Extract for disease control	Ginger, garlic, chilli	1 kg of Garlic should be immersed in 100 ml kerosene and kept overnight. Next day, the outer skin should be removed and made into a paste. Likewise, ½ kg chilly should be mixed with 50 ml water and made into a paste and ½ kg of ginger should be made into a paste. Mix all the three mixtures together in 100 litres of water and 50 grams soap solution as emulsifier. This mixture should be stirred well and filtered before spraying.
Vermi wash as nutrient supplement	Earthworms, FYM and clay containers	Take earthen pot of 10kg capacity and fill it with pieces of stones up to 10cm height from the bottom. Then lay out a thick layer of FYM along with humus containing 1500-2000 worms. Keep moist the material by adding water in the pot regularly. Make a hole at the bottom of the pot and fix a water tap though which vermin wash is to be collected.
Mechanical control of insects	Pheromone, water trap, yellow sticky trap	Place 25 traps of each kind in one hectare at the time of sowing/transplanting of the crop.
Insect control through plant extracts/products (e.g. Leaf/seed/root)	Darek (M. azedarach), Karvi (Roylea cinerea)	For preparing plant extracts, leaves of the test plants (Darek and Karvi) were shade dried for 5-6 days. The dried leaves were then powdered in the mixer- grinder and powdered material was stored in the polythene bags at

	room temperature. About 48 hours
	before use, weighed quantity of the
	powdered test material was dissolved in
	the water in a bucket to which cow
	urine @ 3% was also added. Material in
	the bucket was stirred intermittently.
	Before spray, solution was sieved
	through muslin cloth. Residue in the
	cloth was thoroughly washed to remove
	all the extract. Final volume of the
	extract was made to the desired level
	depending upon the concentration of the
	extract to be sprayed.
Lipel/Dipel (Bacillus	Lipel @1.0 kg/ha or Dipel 1.0 L/ha
thuringiensis sp.	For the control of fruit borer in tomato,
kurstaki)	dissolve 1.0kg of Lipel/ Dipel in 600L of
	water.

Jharkhand

Prepared by Dr. C. S. Singh, Dr. S. K. Singh and R. K. Verma Birsa Agricultural University, Kanke, Ranchi (jharkhand)

Suggested cropping systems (based on testing under NPOF)

- 1. Rice (basmati type)-wheat
- 2. Rice (basmati type)-lentil
- 3. Rice (basmati type)-linseed
- 4. Rice (basmati type)-potato

Cropping System 1: Rice -Wheat

Particulars	Kharif	Rabi
Crop	Rice	Wheat
Fortnight of sowing/planting	Transplanting in 1 st fortnight of July	2 nd fortnight ofNov.
Fortnight of harvesting	1 st fortnight of Nov.	1 st fortnight of April.
Varieties suitable for organic farming	Birsamati	K-9107

Crop (kharif): Rice

Important features of suitable varieties

important reaction of suitable varieties	_ _
Parameters	Birsamati
Duration (days)	125-135 (Medium)
Average yield under organic condition (kg/ha)	3000-3500 kg/ha
Source (s) of availability	AICRP on Rice
-	BAU, Ranchi.
Suitable regions/districts in the state	All district/Jharkhand
Specific resistance / tolerance to pest	Gall midge
Specific resistance / tolerance to disease	Bacterial leaf and sheath blight

Nursery raising practices

Area of nursery required	1000m^2			
for 1 ha				
Nursery raising method	Dry nursery			
Bed size (length X	$1x10m^2$			
breadth in m)				
Seed sowing rate/m ²	35 kg/ha			
Pre-sowing seed/soil	Materials		Method of application	
treatment		or per m ² area		
			For seed dressing metal	
	Pseudomonas	5g/kg of seed	seed dresser	
	fluorescence	e 3g/kg of seed / earthernpots or		
			polythene bags are used	

	Materials	Quantity/ m ² area	Method of ap	oplication
	FYM	1/2 kg	Soil applica	ation at the
Source and optimum			time of	nursery
quantity of organic			preparation	10-15 days
manures/other nutrient			prior to sowi	ng.
source/m ² of nursery	Vermicompost	1/4 kg	Applied alo	ng with soil
			after sowing	to cover the
			seeds.	
Irrigation practices	As and when ne	eded		
Weed management	1 Hand weedin	g		
Organic plant protection	Name	of Recommended	organic	Quantity/
practices	pest/disease	material used fo	r control	m ² area
	Wilt, Bla	st, Nisarga/Monitor/	Biosanjeevni	Seed- 5
	Blight	(Trichoderma vir	ide)	g/litter/kg
Optimum age of nursery	25-30 days	•		
(days)				

Field preparation: The field was ploughed twice 15 days before transplanting the puddling of the soil was done two days prior to transplanting. The green manure crop dhaincha can be grown at seed rate of 40 kg/ha in May month with application of 250 kg/ha of rock phosphate. The dhaincha crop has to be incorporated at 40-45 DAS at 15 days prior to rice transplanting. This will able to meet out the 25-30 kg/ha of nitrogen requirement of paddy crop.

	milky st		C	water		
Irrigation practices	Need based	Tiller initiation, flowering and		3-5 cm standing water		
Ti	Number of irrigations	Most stages irrigation	for	Depth of irrigation (cm)		
Top dressing of organic manufes	Panchagavya	10-12 lit/ha mixed in 500- 600 litre of water				
Top dressing of organic manures	Vermicompost 26		5.66	15 DAT		
				sowing/planting or stage of crop		
	Source	Quantit	y (q/ha)	Days after		
bio-control agents etc	Azolla		1 kg/m^2			
application of bio-fertilizers,	Karanj cake		6.66			
manures including soil	FYM		53.28	(4,)		
Basal application of organic	Source		Quantity	(g/ha)		
Number of seedlings/hill	2 seedlings/hill					
Spacing (Row X plant) in cm	20x10 cm					

	Motha		Nut sedge	Cyperus difformis	
	Dub ghas		Couch	Cynodon dactylon	
			grass		
	Sawa		Water grass	Echinochloa	
				colona	
	Kodo		Goose grass	Eleusine indica	
	Bhangra, Bhangar	aiya	False daisy	Eclipta alba	
	Bara-nagar-motha		Flat sedge	Cyperus iria	
	Kankaua		Day flower	Commelina	
				benghalensis	
Weed management	Critical stage of Reco		mmended pra	actice for organic	
	weeding con-		condition		
	20-25 & 40-45	Hand weeding and summer ploughing		summer ploughing	
	DAT				

	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)
Organic plant protection practices	White ant, grubs	Kalichakra (metarhizium aniopliae)	Soil- 1-2kg/40 kg FYM/acre Foliar-1kg/kg jaggery in 200 litter/acer
	Soil born disease	Trichoderma viride	Vermicompost should be treated with Trichoderma to grow its mycelium and treated vermicompost in used
	Sheath blight and sheath rot	Pseudomonas fluorescence	10 gm/litter of water
	Stem borer	Trichocard	8 trichocard/ha (2 times)
	Blight and false smut Blast	Neem or Karanj cake Bael+Black Tulsi	500 kg/ha at the time of transplanting 25 gm each in 1 litre of water
	Most of the insects leaf folder, stem borer, Gandhi bug	Neem seed kernel extract or Neem oil	Foliar 3-5ml/litre

Parameters	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th year	8 th
	year*	year	year	year	year	year		Year
Economic yield	1970	1880	3191	3396	3945	3305	Abrupt	4050
(kg/ha)							weather	
Price (Rs/kg)	15	15	15	15	15	15		15
(consider 25 %								
premium on								
prevailing market								
price)								
Cost of								
cultivation**(Rs/ha)	26718	26718	26718	26718	26718	26718		26718
Net returns**								
(Rs/ha)	2832	1482	21147	24222	32457	22857		34032

^{*}based on prices of 2013-14

Crop (Rabi): Wheat

Important features of suitable varieties

Parameters	K-9107
Duration (days)	130
Average yield under organic condition (kg/ha)	2000-2500
Source (s) of availability	AICRP on wheat
Suitable regions/districts in the state	All district/Jharkhand
Specific resistance / tolerance to disease	Leaf blight

Field preparation: For field preparation of wheatone deep ploughing followed by 2 -3 harrowing with disc or tines and 2-3 planking should be given to prepare a well pulverised seed bed. Planking should be done after each ploughing.

Seed rate (kg/ha) (Not applicable for nursery crops)	125 kg/ha		
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application
	PSB &Azotobacter	250gm/10 kg seeds each	Warm the water and add 100 gm of jiggery. Mix it well and allow to cool and then add azotobacter culture in it. Finally seed is well mixed with azotobacter culture solution. The treated seed is allowed to dry in shade. Similarly the seed is again treated with PSB and finally sowing is done

Spacing (Row X plant) in cm	Row 20cm			
Basal application of organic	Source	(q/ha)		
manures including soil	FYM		66.66	
application of bio-fertilizers,	Karanj cake		8.33	
bio-control agents etc	J			
	G.		D 6	
Top dressing of organic	Source	Quantity (q/ha)	Days after	
manures			sowing/planting	
	Varreissannsst	33.33	or stage of crop 25-30 DAS	
	Vermicompost			
	Panchagavya	10-12 lit/ha mixed in 500-600 lit of water		
	Number of	Most critical stage	es Depth of	
	irrigations	for irrigation	irrigation (cm)	
T	6	Crown root initiation	n, 5-6cm	
Irrigation practices		tillering, jointing,		
		booting, flowering,		
		milk and dough		
		stages		
	Local name	English name	Scientific name	
	Krishananeel	Red pimpernel	Anagallis	
	T7 . 1'	D 11 11 1	arvensis	
	Kateli	Bull thistle	Cirsium arvense	
	Bathu	Common	Chenopodium	
Major weeds	Motha	lambsquarters	album	
	Moula	Nut sedge	Cyperus difformis	
	Gehusa (gehu ka	Canary grass	Phalaris minor	
	mama)	Callary grass	1 nataris minor	
	Dub ghas	Couch grass	Cynodon	
	Duo giias	Couch grass	dactylon	
Weed management	Critical stage of	Recommended pra	actice for organic	
	weeding	condition	2 6 22	
	20-25 & 40-45	Hand weeding ar	nd stale seed bed	
	Name of	technique Organic materia	al Quantity (kg or	
	pest/disease	recommended fo	• • •	
	pesutisease	control	inites/ iia)	
	White ant,	Kalichakra	Soil- 1-2kg/40 kg	
	grubs	(metarhizium	FYM/acre	
Organic plant protection		aniopliae)	Foliar-1kg/kg	
practices		1 /	jaggery in 200	
			litter/acer	
	Most of the	Neem oil (Multinimor	re Foliar 2.5ml/litre	
	insects	Vanguard)		
	Soil born	Trichoderma viride	Vermicompost	
	disease		should be treated	

		with Trichoderma to grow its mycelium and treated vermicompost in used
Black rust,	Trichoderma	5g/litre of water
brown rust,	herginum+	8
yellow rust and	Pseudomonas	
leaf blight	fluorescence	
Loose smut	Trichoderma herginum	Seed treatment
	or Trichoderma viride	5gm/kg seed

Parameters	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
Economic yield								
(kg/ha)	2048	2366	2528	2587	2000	1875	2240	1950
Price (Rs/kg)	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
(consider 25 %								
premium on								
prevailing market								
price)								
Cost of								
cultivation*(Rs/ha)	36643	36643	36643	36643	36643	36643	36643	36643
Net returns*						-		
(Rs/ha)	-803	4762	7597	8629.5	-1643	3830.5	2557	-2518

^{*}based on prices of 2013-14

Details of Specific Practices/products used/recommended Panchgavya preparation method

Panchgavya can be prepared by mixing 3 litre of cow urine, 5 kg of cow dung, 2 litre of cow milk, curd of 2 litres of cow milk, 1 kg cow ghee, 5 litre water, 500 gm honey, 1 kg jaggery in earthen pot. Then the earthen pot is covered and left for 3 weeks. The prepared Panchgavya should be used only after sieving the material, about 2 litre of Panchgavya should be well mixed in 100 litre of water and sprayed to the crop plants. The prepared Panchgavya would be sufficient 1.5ha of land.

Glimpses

Kharif	Rabi





Rice 100% Organic

Cropping System2: Rice - Lentil

Particulars	Kharif	Rabi
Crop	Rice	Lentil
Fortnight of sowing/planting	Transplanting in 1 st fortnight of July	2 nd fortnight ofNov.
Fortnight of harvesting	1 st fortnight of Nov.	2 nd fortnight of March.
Varieties suitable for organic farming	Birsamati	PL-406

Crop (*kharif*): Rice Important features of suitable varieties

Parameters	Birsamati
Duration (days)	125-135 (Medium)
Average yield under organic condition (kg/ha)	3000-3500 kg/ha
Source (s) of availability	AICRP on Rice
	BAU, Ranchi.
Suitable regions/districts in the state	All district/Jharkhand
Specific resistance / tolerance to pest	Gall midge
Specific resistance / tolerance to disease	Bacterial leaf and sheath blight

Nursery raising practices

Transery ransing practices			
Area of nursery required	1000m^2		
for 1 ha			
Nursery raising method	Dry nursery		
Bed size (length X	$1x10m^2$		
breadth in m)			
Seed sowing rate/m ²	35 kg/ha		
Pre-sowing seed/soil	Materials	Quantity/kg of seed	Method of application
treatment		or per m ² area	

	Pseudomonas fluorescence		5g/kg of seed	For seed dresser/ or polythene used	earthernpots
	Materials	Qu	antity/ m ² area	Method of a	oplication
	FYM	1/2	2 kg	Soil applica	ation at the
Source and optimum quantity of organic manures/other nutrient				time of preparation prior to sowi	10-15 days
source/m ² of nursery	Vermicompost	1/4	- kg	* *	ng with soil to cover the
Irrigation practices	As and when ne	edec	i		
Weed management	1 Hand weedin	g			
Organic plant protection	Name	of	Recommended	organic	Quantity/
practices	pest/disease		material used for	r control	m ² area
	Wilt, Bla	ıst,	Nisarga/Monitor/	Biosanjeevni	Seed- 5
	Blight		(Trichoderma viri	de)	g/litter/kg
Optimum age of nursery (days)	25-30 days				

Field preparation: The field was ploughed twice 15 days before transplanting the puddling of the soil was done two days prior to transplanting. The green manure crop dhaincha can be grown at seed rate of 40 kg/ha in May month with application of 250 kg/ha of rock phosphate. The dhaincha crop has to be incorporated at 40-45 DAS at 15 days prior to rice transplanting. This will able to meet out the 25-30 kg/ha of nitrogen requirement of paddy crop.

Spacing (Row X plant) in cm	20x10 cm			
Number of seedlings/hill (in	2 seedlings/hill			
nursery crops only)				
Basal application of organic	Source	1	Quantity	(q/ha)
manures including soil	FYM		53.28	
application of bio-fertilizers,	Karanj cake		6.66	
bio-control agents etc	Azolla		1 kg/m^2	
	Source	Quantity	(q/ha)	Days after
				sowing/planting or
				stage of crop
Top dressing of organic manures	Vermicompost	26.	.66	15 DAT
Top dressing of organic manufes	Panchagavya	10-12 lit/ha		
		mixed i	in 500-	
		600 li	tre of	
		wa		
	Number of	Most	critical	Depth of irrigation
Irrigation practices	irrigations	stages	for	(cm)
Inigation practices		irrigation	n	
	Need based	Tiller in	nitiation,	3-5 cm standing

		flower milky	C	water
	Local Name		English Name	Scientific Name
	Motha		Nut sedge	Cyperus difformis
	Dub ghas		Couch grass	Cynodon dactylon
Major weeds	Sawa		Water grass	Echinochloa colona
	Kodo		Goose grass	s Eleusine indica
	Bhangra, Bhanga	raiya	False daisy	Eclipta alba
	Bara-nagar-moth	a	Flat sedge	Cyperus iria
	Kankaua		Day flower	Commelina
				benghalensis
Weed management	Critical stage of	Reco	mmended p	ractice for organic
	weeding	cond	ition	
	20-25 & 40-45 DAT	Hand	l weeding and	d summer ploughing

	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)
	White ant, grubs	Kalichakra (metarhizium aniopliae)	Soil- 1-2kg/40 kg FYM/acre Foliar-1kg/kg jaggery in 200 litter/acer
Organic plant protection practices	Soil born disease	Trichoderma viride	Vermicompost should be treated with Trichoderma to grow its mycelium and treated vermicompost in used
	Sheath blight and sheath rot	Pseudomonas fluorescence	10 gm/litter of water
	Stem borer	Trichocard	8 trichocard/ha (2 times)
	Blight and false smut	Neem or Karanj cake	500 kg/ha at the time of transplanting
	Blast	Bael+Black Tulsi	25 gm each in 1 litre of water
	Most of the insects leaf folder, stem	Neem seed kernel extract or Neem oil	Foliar 3-5ml/litre

	borer, bug	Gandhi	

Parameters	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
	*year							
Economic yield (kg/ha)	1970	1880	3191	3396	3945	3305	Abrupt weather	4050
Price (Rs/kg) (consider 25 % premium on prevailing market price)	15	15	15	15	15	15		15
Cost of cultivation*(Rs/ha)	26718	26718	26718	26718	26718	26718		26718
Net returns* (Rs/ha)	2832	1482	21147	24222	32457	22857		34032

^{*}based on prices of 2013-14

Crop (Rabi):Lentil

Important features of suitable varieties

Parameters	PL - 406
Duration (days)	115
Average yield under organic condition (kg/ha)	600-800
Source (s) of availability	Directorate of Seed & Farm, BAU.
Suitable regions/districts in the state	All district /Jharkhand
Specific resistance / tolerance to disease	moderately resistant wilt and rust

Field preparation: For field preparation of lentil one deep ploughing followed by 2-3 cross harrowing should be given. After harrowing, the field should be levelled by giving a gentle slope to ease in irrigation.

Seed rate (kg/ha) (Not applicable	25-30 kg/ha		
for nursery crops)			
Pre-sowing/planting treatment of	Material	Recommended	Method of
seed/seedlings		rate (kg/ha or	application
		lit/ha)	
	PSB & Rhizobium	250 g/10 kg	Warm the water
	culture	seeds	and add 100 gm of
			jiggery. Mix it

				well and allow to
				cool and then add
				rhizobium culture
				in it. Finally seed
				is well mixed with
				rhizobium culture
				solution. The
				treated seed is
				allowed to dry in
				shade. Similarly
				the seed is again
				treated with PSB
				and finally sowing
				is done
Spacing (Row X plant) in cm	25x 8cm		I	
Basal application of organic	Source		Quantity(• ′
manures including soil	FYM			14.0
application of bio-fertilizers, bio-	Karanj cake			
control agents etc	Training care			2.0
Top dressing of organic manures	Source	Quantity(q/ha)		Days after
				sowing/planting or
				stage of crop
	Vermicompost	7.0		25-30 DAS
	Number of	Most	critical	Depth of irrigation
	irrigations	stages	for	(cm)
Irrigation practices	irriga			<i>5.6</i>
	2	Pre-flov	wering	5-6
		stage		
	Local name	English		Scientific name
	Krishananeel	Red pir	•	Anagallis arvensis
	Kateli	Bull thi	stle	Cirsium arvense
Major weeds	Bathu	Commo	on	Chenopodium
Wildon Weeds		lambsq	uarters	album
		Nut grass		C 1:CC .
	Motha	Nut gra	.SS	Cyperus difformis
	Motha Dub ghas	Bermud		Cynodon dactylon
			la grass	* 1 00
Weed management	Dub ghas	Bermud Sweet p	la grass bea	Cynodon dactylon
Weed management	Dub ghas Kheshari	Bermud Sweet p	la grass pea mended p	Cynodon dactylon Lathyrus odoratus
Weed management	Dub ghas Kheshari Critical stage of	Bermuc Sweet p Recommendation	da grass bea mended p	Cynodon dactylon Lathyrus odoratus
Weed management	Dub ghas Kheshari Critical stage of weeding	Bermuc Sweet p Recommendation	da grass bea mended p on weeding a	Cynodon dactylon Lathyrus odoratus ractice for organic

practices	pest/disease	recommended for	litres/ ha)
		control	
	White ant,	Kalichakra	Soil- 1-2kg/40 kg
	grubs	(metarhizium	FYM/acre
		aniopliae)	Foliar-1kg/kg
			jaggery in 200
			litter/acer
	Most of the	Neem oil	Foliar 2.5ml/litre
	insects	(Multinimore	
		Vanguard)	
	Soil borne	Trichoderma	FYM or
	disease		Vermicompost
			treated with
			trichoderma and
			applied to the field

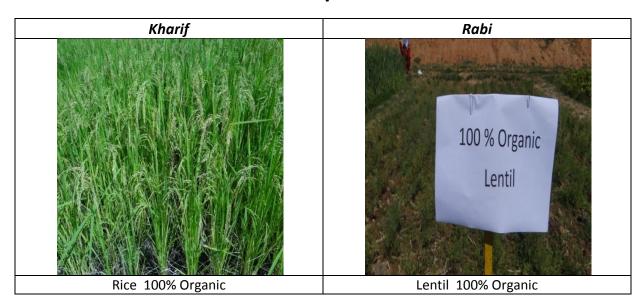
Parameters	1 st	2 nd	3 rd	4 th	5 th	6 th	$7^{ ext{th}}$	8 th
	*year							
Economic yield	650	735	920	750	562	0	770	649
(kg/ha)								
Price (Rs/kg)								
(consider 25 %	25	25	25	25	25	25	25	25
premium on	35	35	35	35	35	35	35	35
prevailing market								
price)								
Cost of	13567	13567	13567	13567	13567	13567	13567	13567
cultivation*(Rs/ha)	13307	13307	13307	13307	13307	13307	13307	13307
Net returns*						-		
(Rs/ha)	9183	12158	18633	12683	6103	13567	13383	9148

^{*}based on prices of 2013-14

Details of Specific Practices/products used/recommended

Panchgavya can be prepared by mixing 3 litre of cow urine, 5 kg of cow dung, 2 litre of cow milk, curd of 2 litres of cow milk, 1 kg cow ghee, 5 litre water, 500 gm honey, 1 kg jaggery in earthen pot. Then the earthen pot is covered and left for 3 weeks. The prepared Panchgavya should be used only after sieving the material, about 2 litre of Panchgavya should be well mixed in 100 litre of water and sprayed to the crop plants. The prepared Panchgavya would be sufficient 1.5ha of land.

Glimpses



Cropping System 3: Rice – Linseed

Particulars	Kharif	Rabi		
Crop	Rice	Linseed		
Fortnight of sowing/planting	Transplanting in 1 st fortnight of July	2 nd fortnight ofNov.		
Fortnight of harvesting	1 st fortnight of Nov.	1 st fortnight of April.		
Varieties suitable for organic farming	Birsamati	Shekhar		

Crop (*kharif*): Rice
Important features of suitable varieties

Parameters	Birsamati
Duration (days)	125-135 (Medium)
Average yield under organic condition (kg/ha)	3000-3500 kg/ha
Source (s) of availability	AICRP on Rice BAU, Ranchi.
Suitable regions/districts in the state	All district/Jharkhand
Specific resistance / tolerance to pest	Gall midge
Specific resistance / tolerance to disease	Bacterial leaf and sheath blight

Nursery raising practices

ransery raising practices	
Area of nursery required	1000m^2
for 1 ha	
Nursery raising method	Dry nursery
Bed size (length X	$1 \times 10 \text{m}^2$
breadth in m)	
Seed sowing rate/m ²	35 kg/ha

Pre-sowing seed/soil	Materials	Quantity/kg of seed	Method of ap	pplication
treatment		or per m ² area		
	Pseudomonas fluorescence	5g/kg of seed	or polythene used	earthernpots bags are
	Materials	Quantity/ m ² area	Method of ap	pplication
	FYM	1/2 kg	Soil applica	ation at the
Source and optimum			time of	nursery
quantity of organic				10-15 days
manures/other nutrient				ng.
source/m ² of nursery	Vermicompost	vermicompost 1/4 kg		ng with soil
			after sowing	to cover the
			seeds.	
Irrigation practices	As and when ne	eded		
Weed management	1 Hand weedin	g		
Organic plant protection	Name	of Recommended	organic	Quantity/ m ² area
practices	pest/disease	material used fo	r control	m ² area
	Wilt, Bla	st, Nisarga/Monitor/	Biosanjeevni	Seed- 5
	Blight	(Trioderma virde)	g/litter/kg
Optimum age of nursery (days)	25-30 days	,		

Field preparation: The field was ploughed twice 15 days before transplanting the puddling of the soil was done two days prior to transplanting. The green manure crop dhaincha can be grown at seed rate of 40 kg/ha in May month with application of 250 kg/ha of rock phosphate. The dhaincha crop has to be incorporated at 40-45 DAS at 15 days prior to rice transplanting. This will able to meet out the 25-30 kg/ha of nitrogen requirement of paddy crop.

Cultural practices						
Spacing (Row X plant) in cm 20x10 cm						
Number of seedlings/hill (in	2 seedlings/hill					
nursery crops only)						
Basal application of organic	Source		Quantity	(q/ha)		
manures including soil	FYM		53.28			
application of bio-fertilizers,	Karanj cake		6.66			
bio-control agents etc	Azolla		1 kg/m^2			
	Source	Quantity (q/ha)		Days after sowing/planting or stage of crop		
	Vermicompost	20	6.66	15 DAT		
Top dressing of organic manures				13 13 13 13 13 13 13 13 13 13 13 13 13 1		
	Panchagavya	10-12 lit/ha				
		mixed in 500-				
		600 litre of				
	,		ater			
Irrigation practices	Number of	Most	critical	Depth of irrigation		
migation practices	irrigations	stages	for	(cm)		

		irrigat	ion		
	Need based	Tiller	initiation, 3	3-5 cm standing	
		flower	ring and v	water	
		milky	stage		
	Local Name		English	Scientific Name	
			Name		
	Motha		Nut sedge	Cyperus difformis	
	Dub ghas		Couch	Cynodon dactylon	
			grass		
Major weeds	Sawa		Water grass	Echinochloa	
				colona	
	Kodo		Goose grass	Eleusine indica	
	Bhangra, Bhanga	raiya	False daisy	Eclipta alba	
	Bara-nagar-moth	a	Flat sedge	Cyperus iria	
	Kankaua		Day flower	Commelina	
				benghalensis	
Weed management	Critical stage of	Reco	mmended pr	ractice for organic	
	weeding	cond	ition		
	20-25 & 40-45	Hand	l weeding and	summer ploughing	
	DAT				

	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)
	White ant, grubs	Kalichakra (metarhizium aniopliae)	Soil- 1-2kg/40 kg FYM/acre Foliar-1kg/kg jaggery in 200 litter/acer
Organic plant protection practices	Soil born disease	Trichoderma viride	Vermicompost should be treated with Trichoderma to grow its mycelium and treated vermicompost in used
	Sheath blight and sheath rot Stem borer	Pseudomonas fluorescence Trichocard	10 gm/litter of water 8 trichocard/ha (2 times)
	Blight and false smut Blast	Neem or Karanj cake Bael+Black Tulsi	500 kg/ha at the time of transplanting 25 gm each in 1 litre of water

Most	of	the	Neem	seed	Foliar 3-5ml/litre
insects		leaf	kernel	extract	
folder,		stem	or Neen	ı oil	
borer,	G	andhi			
bug					

Ticia and Economi								
Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
Economic yield (kg/ha)	1970	1880	3191	3396	3945	3305	Abrupt weather	4050
Price (Rs/kg) (consider 25 % premium on prevailing market price)	15	15	15	15	15	15		15
Cost of cultivation*(Rs/ha)	26718	26718	26718	26718	26718	26718		26718
Net returns* (Rs/ha)	2832	1482	21147	24222	32457	22857		34032

^{*}based on prices of 2013-14

Crop (Rabi): Linseed

Important features of suitable varieties

Parameters	Shekhar
Duration (days)	140
Average yield under organic condition (kg/ha)	500-700
Source (s) of availability	Directorate of seed & farm, BAU.
Suitable regions/districts in the state	All district/Jharkhand
Specific resistance / tolerance to pest	Moderately resistant to bud fly
Specific resistance / tolerance to disease	Resistant to powdery mildew, rust, wilt and moderately resistant to alternaria blight

Field preparation: Field should be prepared by giving 1 ploughing by soil turning plough followed by 2-3 harrowing and finally planking.

F			
Seed rate (kg/ha)	25-30 kg/ha		
Pre-sowing/planting treatment	Material	Recommended	Method of application
of seed/seedlings		rate (kg/ha or	
		lit/ha)	
	PSB	250 g/10 kg	Warm the water and add
	&Azotobacter	seeds each	100 gm of jiggery. Mix it

Spacing (Row X plant) in cm Number of seedlings/hill (in nursery crops only)	Row 30cm			then culture is w azotob solution is allow Similar treated	add azotobacter in it. Finally seed well mixed with acter culture on. The treated seed wed to dry in shade. The treated is again with PSB and sowing is done	
Basal application of organic	Source			Quantity	(q/ha)	
manures including soil	FYM			,	26.66	
application of bio-fertilizers, bio-control agents etc	Karanj cake				3.33	
Top dressing of organic manures	Source			y (q/ha)	Days after sowing/planting or stage of crop	
	Vermicompost		13.33		25-30 DAS	
	Number irrigations	of	Most stages irrigati	critical for ion	Depth of irrigation (cm)	
Irrigation practices	3		at 35, 5 days af	proved	5-6 cm	
	Local name		English name		Scientific name	
	Krishananeel			npernel	Anagallis arvensis	
Major weeds	Kateli		Bull thi	istle	Cirsium arvense	
Wajor weeds	Bathu		Commo lambsq	uarters	Chenopodium album	
	Motha		Nut gra		Cyperus difformis	
	Dub ghas		Bermuda grass		Cynodon dactylon	
Weed management	Critical stage weeding	of	Recommended practice for organi condition			
	20-25 & 40-45		techniq	ue	and stale seed bed	
Organic plant protection	Name pest/disease	of		material ended for	Quantity (kg or litres/ ha)	
practices	White ant, grubs	Ī	Kalichak (metarhi		Soil- 1-2kg/40 kg FYM/acre	

		jaggery in 200 litter/acer
Most of the insects	Neem oil	Foliar 2.5ml/litre
	(Multinimore	
	Vanguard)	
Soil born disease	Trichoderma	Trichoderma
		powder mixed
		with vermicompost of
		FYM to develop
		its mycelium and
		applied to whole
		field

Parameters	1 st *	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
Economic yield (kg/ha)	492	350	420	400	550	700	790	795
Price (Rs/kg) (consider 25 % premium on prevailing market price)	21.25	21.25	21.25	21.25	21.25	21.25	21.25	21.25
Cost of cultivation*(Rs/ha)	14065	14065	14065	14065	14065	14065	14065	14065
Net returns* (Rs/ha)	-3610	-6627	-5140	-5565	-2377	810	2722	2829

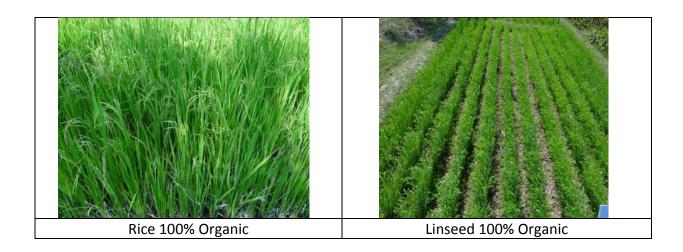
^{*}based on prices of $2\overline{013-14}$

Details of Specific Practices/products used/recommended Panchgavya preparation method

Panchgavya can be prepared by mixing 3 litre of cow urine, 5 kg of cow dung, 2 litre of cow milk, curd of 2 litres of cow milk, 1 kg cow ghee, 5 litre water, 500 gm honey, 1 kg jaggery in earthen pot. Then the earthen pot is covered and left for 3 weeks. The prepared Panchgavya should be used only after sieving the material, about 2 litre of Panchgavya should be well mixed in 100 litre of water and sprayed to the crop plants. The prepared Panchgavya would be sufficient 1.5ha of land.

Glimpses

Kharif Rabi



Cropping System 4: Rice – Potato

Particulars	Kharif	Rabi
Crop	Rice	Potato
Fortnight of sowing/planting	Transplanting in 1 st fortnight of July	2 nd fortnight of Nov.
Fortnight of harvesting	1 st fortnight of Nov.	2 nd fortnight of Feb.
Varieties suitable for organic farming	Birsamati	Kufri Ashoka

Crop (kharif): Rice

Important features of suitable varieties

Parameters	Birsamati
Duration (days)	125-135 (Medium)
Average yield under organic condition (kg/ha)	3000-3500 kg/ha
Source (s) of availability	AICRP on Rice ,BAU, Ranchi.
Suitable regions/districts in the state	All district/Jharkhand
Specific resistance / tolerance to pest	Gall midge
Specific resistance / tolerance to disease	Bacterial leaf and sheath blight

Nursery raising practices

nursery raising practices							
Area of nursery required	1000m^2						
for 1 ha							
Nursery raising method	Dry nursery						
Bed size (length X	$1x10 \text{ m}^2$						
breadth in m)							
Seed sowing rate/m ²	35 kg/ha						
Pre-sowing seed/soil	Materials	Quantity/kg of seed	Method of application				
treatment		or per m ² area					
	Pseudomonas fluorescence	5g/kg of seed	For seed dressing metal seed dresser / earthern pots or polythene bags are				

			used			
	Materials	Quantity/ n	n ² area Method	d of application		
	FYM	1/2 kg	Soil a	pplication at the		
Source and optimum			time	of nursery		
quantity of organic			prepara	tion 10-15 days		
manures/other nutrient			-	sowing.		
source/m ² of nursery	Vermicompost	1/4 kg		Applied along with soil		
				owing to cover the		
			seeds.			
Irrigation practices	As and when ne	eded				
Weed management	1 Hand weedin	<u> </u>				
Organic plant protection	Name	of Recomi	nended org	anic Quantity/		
practices	pest/disease	materia	l used for contro	l m ² area		
	Wilt, Bla	st, Nisarga	/Monitor/Biosanje	evni Seed- 5		
	Blight	(Tricho	derma viride)	g/litter/kg		
Optimum age of nursery	25-30 days	•		•		
(days)						

Field preparation: The field was ploughed twice 15 days before transplanting the puddling of the soil was done two days prior to transplanting. The green manure crop dhaincha can be grown at seed rate of 40 kg/ha in May month with application of 250 kg/ha of rock phosphate. The dhaincha crop has to be incorporated at 40-45 DAS at 15 days prior to rice transplanting. This will able to meet out the 25-30 kg/ha of nitrogen requirement of paddy crop.

Spacing (Row X plant) in cm	20x10 cm					
Number of seedlings/hill	2 seedlings/hill					
Basal application of organic	Source		Quantity	(q/ha)		
manures including soil	FYM		53.28			
application of bio-fertilizers,	Karanj cake		6.66			
bio-control agents etc	Azolla		1 kg/m^2			
	Source	Quantit	y (q/ha)	Days after		
				sowing/planting or		
Top dressing of organic				stage of crop		
manures	Vermicompost		5.66	15 DAT		
manures	Panchagavya	10-12 lit/ha				
		mixed in 500-				
		600 litr	e of water			
	Number of	Most	critical	Depth of irrigation		
	irrigations	stages	for	(cm)		
Irrigation practices		irrigatio				
irrigation practices	Need based	Tiller	initiation,	3-5 cm standing		
		flowering	ng and	water		
		milky s	tage			
Major weeds						

	Local Name		English	Scientific Name	
			Name		
	Motha		Nut sedge	Cyperus difformis	
	Dub ghas		Couch grass	Cynodon dactylon	
	Sawa		Water grass	Echinochloa	
				colona	
	Kodo		Goose grass	Eleusine indica	
	Bhangra, Bhangaraiy	'a	False daisy	Eclipta alba	
	Bara-nagar-motha		Flat sedge	Cyperus iria	
	Kankaua		Day flower	Commelina	
				benghalensis	
Weed management	Critical stage of	Reco	mmended pra	actice for organic	
	weeding	condition			
	20-25 & 40-45	Hand weeding and summer ploughing			
	DAT				

	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)	
	White ant, grubs	Kalichakra (metarhizium aniopliae)	Soil- 1-2kg/40 kg FYM/acre Foliar-1kg/kg jaggery in 200 litter/acre	
Organic plant protection practices	Soil born disease	Trichoderma viride	Vermicompost should be treated with Trichoderma to grow its mycelium and treated vermicompost in used	
	Sheath blight and sheath rot	Pseudomonas fluorescence	10 gm/litter of water	
	Stem borer	Trichocard	8 trichocard/ha (2 times)	
	Blight and false smut	Neem or Karanj cake	500 kg/ha at the time of transplanting	
	Blast	Bael+Black Tulsi	25 gm each in 1 litre of water	
	Most of the insects leaf folder, stem borer, Gandhi bug	Neem seed kernel extract or Neem oil	Foliar 3-5ml/litre	

Parameters	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
	*year							

Economic yield	1970	1880	3191	3396	3945	3305	4050	
(kg/ha)								
Price (Rs/kg) (consider 25 % premium on prevailing market price)		15	15	15	15	15	15	
Cost of cultivation*(Rs/ha)		26718	26718	26718	26718	26718	26718	
Net returns* (Rs/ha)	2832	1482	21147	24222	32457	22857		34032

^{*}based on prices of 2013-14

Crop (Rabi): Potato

Important features of suitable varieties

Parameters	Kufri Ashoka (Potato)
Duration (days)	95
Average yield under organic condition (kg/ha)	18000-20000
Source (s) of availability	Ram Krishna Mission, Ranchi
Suitable regions/districts in the state	All district/Jharkhand

Field preparation: Land should be well prepared by deep ploughing with mould-bold plough followed by 3-4 cross harrow wings. Each harrowing should be followed by planking so that the soil is well pulverised and levelled.

Seed rate (kg/ha)	300 kg/ha		
Pre-sowing/planting treatment of	Material	Recommended rate	Method of
seed/seedlings		(kg/ha or lit/ha)	application
	PSB &Azotobacter	250 g/10 kg seeds	Warm the water and add 100 gm of jiggery. Mix it well and allow to cool and then add azotobacter culture in it. Finally seed is well mixed with azotobacter culture
			solution. The treated seed is allowed to dry in shade. Similarly the seed is again treated with PSB and finally sowing is done

Spacing (Row X plant) in cm	Row to row 50cm	n, tuber to	tuber 20c	m	
Basal application of organic	Source		Quantity		
manures including soil	FYM		_	80.0	
application of bio-fertilizers, bio- control agents etc	Karanj cake			10.0	
Top dressing of organic manures	Source	Quantit	y (q/ha)	Days after sowing/planting or stage of crop	
	Vermicompost	40.0		25-30 DAS	
	Number of irrigations	stages irrigation		Depth of irrigation (cm)	
Irrigation practices	4-5	1 st irrig 4-5 day seeding after 10 interval	than days	5-6 cm	
	Local name	English	name	Scientific name	
	Krishananeel	Red pin	npernel	Anagallis arvensis	
	Kateli	Bull thistle		Cirsium arvense	
Major weeds	Bathu	Common		Chenopodium	
		lambsquarters		album	
	Motha	Nut grass		Cyperus difformis	
	Dub ghas	Bermuda grass		Cynodon dactylon	
Weed management	Critical stage of weeding	Recommended practice for organic condition			
	20-25 & 40-45	Hand techniq		and stale seed bed	
Organic plant protection practices	Name of pest/disease	recomme control	material ended for	Quantity (kg or litres/ ha)	
	White ant, grubs	Kalichak (metarhiz aniopliae	zium e)	Soil- 1-2kg/40 kg FYM/acre Foliar-1kg/kg jaggery in 200 litter/acer	
	Most of the insects	Neem (Multinii Vanguar	d)	Foliar 2.5ml/litre	
	Black Scurf	Trichode treated cake	rma Neem	Soil application @ 5 q/ha	

Parameters	1 st *	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th

Economic	9110	17283	19500	20500	19166	18750	19000	19300
yield (kg/ha)								
Price (Rs/kg)	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50
(consider 25 %								
premium on								
prevailing								
market price)								
Cost of	64250	64250	64250	64250	64250	64250	64250	64250
cultivation								
(Rs/ha)								
Net returns	49625	151787.5	179500	192000	175325	170125	173250	177000
(Rs/ha)				- 000				

^{*}based on prices of 2013-14

Details of Specific Practices/products used/recommended Panchgavya preparation method

Panchgavya can be prepared by mixing 3 litre of cow urine, 5 kg of cow dung, 2 litre of cow milk, curd of 2 litres of cow milk, 1 kg cow ghee, 5 litre water, 500 gm honey, 1 kg jaggery in earthen pot. Then the earthen pot is covered and left for 3 weeks. The prepared Panchgavya should be used only after sieving the material, about 2 litre of Panchgavya should be well mixed in 100 litre of water and sprayed to the crop plants. The prepared Panchgavya would be sufficient 1.5ha of land.

Glimpses



Kerala

Package of Practices for Organic Crop Production

Prepared by G. Suja, A.N. Jyothi and J. Sreekumar, ICAR-Central Tuber Crops Research Institute, Sreekariyam, Thiruvananthapuram, Kerala

Suggested cropping systems (based on testing under ICAR-CTCRI)

- 1. Elephant foot yam + green manure cowpea
- 2. Green manure cowpea-yams + green manure cowpea
- 3. Taro + green manure cowpea

Details of Cropping Systems

Cropping System 1: Elephant foot yam + green manure cowpea

Particulars	Kharif	Rabi	Summer
Crop	Elephant foot yam	Elephant foot yam	Elephant foot yam +
	and green manure	taken during summer	green manure
	cowpea taken during	continues	cowpea
	summer continues		
Fortnight of			I fortnight of March
sowing/planting			planting elephant
			foot yam and sowing
			cowpea
Fortnight of	,	=	
harvesting	harvesting and	January harvesting	
	incorporating green	elephant foot yam	
N/ 1 11 C	manure cowpea		
Varieties suitable for			Elephant foot yam:
organic farming			Gajendra, Sree
			Padma, Sree Athira, Peerumade local,
			Vegetable and Fruit
			Promotion Council
			Keralam (VFPCK)
			local
			Green manure
			cowpea: C-152

Crop: Elephant foot yam

Important features of suitable varieties

Parameters	Gajendra	Sree	Sree Athira	Peerumade	VFPCK local
		Padma		local	
Duration (days)	240-270	240-270	240-270	240-270	240
Average yield under	33.69	28.85	23.26	26.71	26.09

organic (t/ha)	condit	ion					
Source availability	(s) '	of	ICAR-CTCRI	ICAR-CTCRI	ICAR-CTCRI	Locally from Peerumade Development Society (PDS), Pothupara, Idukki dt., Kerala	Vegetable and Fruit Promotion Council Keralam (VFPCK)
Suitable regions/disthe state	stricts	in	Throughout the state	Throughout the state	Throughout the state	Throughout the state	Throughout the state

Field preparation: The land is ploughed to a depth of 15-20 cm and levelled. Pits of 60 cm x 60 cm x 45 cm size may be dug 90 cm apart. The topsoil is to be collectedup to a depth of 15-20 cm separately and filledin the pits. FYM: neem cake mixture (10:1) incubated with *Trichoderma* isapplied@ 3 kg pit⁻¹ (36 t/ha) and mixed with topsoil. Neem cake is applied@ 1.0 t/ha(80 g/pit) at the time of planting. Corm pieces of 500 g with a portion of terminal bud treated with slurry containing cowdung, neem cake and *Trichoderma harzianam* (5g/kg seed) are planted in the pits. Immediately after planting elephant foot yam, green manure cowpea is sown@ 20 kg ha⁻¹.

Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha lit/ha)	d or	Method application	of
	Bio-control agent				
	Cowdung	Trichoderma	5	Seed treatment	
	slurry mixed	g/kg seed			
	with neem cake and				
	Trichoderma				
	harzianum				
Spacing (Row X plant) in cm	90 cm x 90 cm				
Basal application of organic	Source		Quantity/ha		
manures including soil	FYM + neem	cake mixture	36 t/ha		
application of bio-fertilizers, bio-	(10:1) inocu	lated with			
control agents etc	Trichoderma h	arzianum (2.5	1 t/	ha	
	kg/ tonne of FYM: neem cake				
	mixture)				
	Neem cake				
Top dressing of organic manures	Source	Quantity/ha		Days a	fter
				sowing/planting	or
				stage of crop	

	Green	20 – 25 t /ha	45-60 DAP			
	manuring with					
	cowpea	- "				
	Ash	3 t/ha	45-60 DAP (at the			
			time of			
			incorporation of green manure			
			green manure cowpea)			
Irrigation practices	Number of	Most critical	Depth of irrigation			
garaen praesises	irrigations	stages for	(cm)			
	0	irrigation	(- /			
	Rainfed. Life sa		wice per week until			
	sprouting, if pro	longed dry spell occ	urs.			
Major weeds	<i>Muthanga-</i> Purp	olenutsedge- <i>Cyperus</i>	rotundus			
	Thazhuthama-S _l	oreading hog weed- <i>l</i>	Boerhaavia diffusa			
		ld mustard-Cleome				
	_	hinjil-Tephrosia pur _l				
	· ·	Red tassel flower- En	-			
		Poovamkurunnu-Purple fleabane- <i>Vernonia cinerea</i>				
	Kurumthotti-Common wire weed- <i>Sida acuta</i>					
Wood management	Kurumthotti-Sida hemp-Sida rhombifolia					
Weed management	weeding	Critical stage of Recommended practice for organic weeding condition				
	45 DAP and 75	and 75 Mulching immediately after planti				
	DAP and two hand weedings at 45 days a					
		one month later				
Organic plant protection	Name of	Organic material	Quantity (kg or			
practices	pest/disease	recommended for	litres/ ha)			
	Callanas	control	Title days 10			
	Collar rot	FYM: Neem cake	Trichoderma (@			
		mixture (10:1) inoculated with	2.5 kg/tonne of FYM: neem cake			
		Trichoderma	mixture) @ 90			
		harzianum	kg/ha			
			1.6/ 1.6.			
		Seed treatment				
		with cowdung				
		slurry mixed with	Trichoderma (@ 5			
		neem cake and	g/kg seed) @ 31.25			
		Trichoderma	kg/ha			
		harzianum				
Optimum stage of harvesting	8-9 months					

Parameters	1 st	2 nd year	3 rd	4 th year	5 th year	6 th year	7 th year
	year*		year				
Economic yield	65.87	70.63	56.95	57.23	34.81		
(t/ha)							
Price (Rs/kg)	Rs. 8/k	g					
(consider 25 %							
premium on							
prevailing market							
price)							
Cost of cultivation	Rs. 241	L000/ha					
(Rs/ha)							
Net returns (Rs/ha)	Rs. 215	5776/ha					

^{*}based on prices of 2013-14

Glimpses

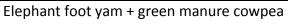




Cowdung: neem cake mixture inoculated with *Trichodermaharzianum*

Cost-effective practice of green manuring







View of the experiment on Organic farming of elephant foot yam



Cropping System 2: Yams + green manure cowpea

Particulars	Kharif	Rabi
Crop	Yams and green manure cowpea	Yams continue
Fortnight of sowing/planting	I fortnight of May planting	
	yams and sowing green	
	manure cowpea	
Fortnight of harvesting	II fortnight of June	First fortnight of January
	harvesting and incorporation	harvesting yams
	of green manure cowpea	

Crop: Yams

Important features of suitable varieties

Parameters	White yam	Greater yam	Lesser yam	Dwarf white
				yam
	Var. Sree	Var. Sree	Var. Sree Latha	Var. Sree
	Priya	Keerthi		Dhanya
Duration (days)	270 – 300	270 – 300	210-240	210-240
Average yield under	22.21	21.96	16.83	13.23
organic condition				
(t/ha)				
Source (s) of	ICAR-CTCRI	ICAR-CTCRI	ICAR-CTCRI	ICAR-CTCRI
availability				
Suitable	Throughout	Throughout the	Throughout the	Throughout the
regions/districts in	the state	state	state	state
the state				

Field preparation: The land is ploughed to a depth of 15-20 cm. Pits of 45 x 45 x45 cm size is opened for planting greater yam and white yam at a spacing of 90×90 cm. Three-fourths of the pit is filled with top soil and FYM and reformed into mound. For raising lesser yam, mounds may be formed at a spacing of 75×75 cm after broadcasting FYM. In the case of

greater yam and white yam, tuber pieces of 250-300 g size can be used as planting material. For planting lesser yam, medium sized tuber of 100-150 g is sufficient.

Cultural practices

Seed rate (kg/ha)					
Spacing (Row X plant) in cm		White yam and greater yam : 90 x 90 cm			
	Lesser yam: 75 x 75 cm				
	Dwarf white yam	ı: 60 x 60	cm		
Number of seedlings/hill	Not applicable		1		
Basal application of organic	Source		Quantity,	/ha	
manures including soil	FYM		15 t/ha		
application of bio-fertilizers, bio-	Neem cake		1 t/ha		
control agents etc	Biofertilizers				
	Azospirillum		3 kg/ha		
	Mycorrhiza		5 kg/ha		
	Phosphobacteria	1	3 kg/ha		
To a decession of	Co		//	D	
Top dressing of organic manures	Source	Quantit	ty/na	Days after	
				sowing/planting or	
	Croon	1F 20+	/ha	stage of crop 45-60 DAP	
	Green	15-20 t	/IId	45-60 DAP	
	manuring with cowpea				
	Ash	1.5 t/ha		45-60 DAP (at the	
	ASII	1.5 (/110	a	time of	
				incorporation of	
				green manure	
				cowpea)	
Major weeds	Muthanga-Purple	enutsedg	e-Cyperus		
-	Karuka-Bermuda	_			
	Thazhuthama- Sp	oreading	hog weed-	Boerhaavia diffusa	
	Muyal chevian-R	ed tassel	flower- En	nilia sonchifolia	
	Poovamkurunnu-	-Purple f	leabane- <i>Ve</i>	ernonia cinerea	
	Kurumthotti-Con	nmon wi	re weed- <i>Si</i>	da acuta	
Weed management	Critical stage of	Recomi	mended p	practice for organic	
	weeding	condition			
	45 DAP and 75 Mulching in		ng immed	iately after planting	
	DAP			edings at 45 days and	
			nth later		
Optimum stage of harvesting	White yam and g	•			
	Lesser yam and o	dwarf wh	ite yam: 7-	-8 months	

Yield and Economics

Parameters	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th

	year*						
Economic yield							
(kg/ha)							
White yam	17.81	27.16	28.34	18.56	19.22		
Greater yam	19.47	26.30	17.29	21.67	25.07	46.45	
Lesser yam	8.59	24.95	23.57	10.92	16.12	19.28	
Dwarf white yam	12.60	12.28	14.79	16.38			
Price (Rs/kg)	Greate	r yam: Rs.	20/kg				
(consider 25 %	Lesser	yam: Rs. 20	0/kg				
premium on	Dwarf	white yam	: Rs. 20/k	g			
prevailing market							
price)							
Cost of cultivation	Greate	r yam: Rs.	430020				
(Rs/ha)	Lesser	yam: Rs. 3	30020				
	Dwarf white yam: Rs. 303900						
Net returns (Rs/ha)	Greater yam: Rs. 498940						
	Lesser yam: Rs. 55620						
	Dwarf	white yam	: Rs. 1870	520			

^{*}based on prices of 2013-14

Glimpses



Yams + green manure cowpea



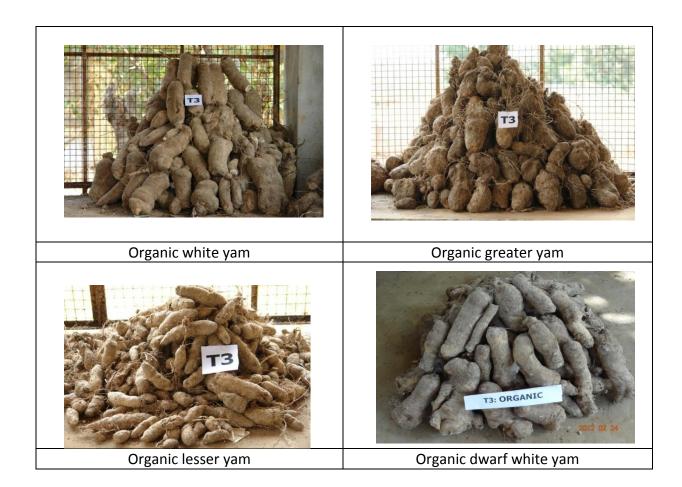
View of the experiment on Organic farming of yams (trailing genotypes)



View of the experiment on Organic farming of dwarf white yam



Green manure cowpea in between dwarf white yam mounds



Cropping System 3: Taro + green manure cowpea

Particulars	Kharif	Rabi
Crop	Taro and green manure cowpea	Taro continues
Fortnight of sowing/planting	I fortnight of June planting taro and sowing green manure cowpea	
Fortnight of harvesting	II fortnight of July harvesting and incorporation of green manure cowpea	Second fortnight of November harvesting taro

Important features of suitable varieties

Parameters	Sree Kiran	Sree Rashmi	Local		
Duration (days)	190-210	210	210		
Average yield under	10.36	11.19	10.36		
organic condition (t/ha)					
Source (s) of availability	ICAR-CTCRI	ICAR-CTCRI	VFPCK		
Suitable regions/districts in	All regions of the	All regions of the	All regions of the		
the state	state	state	state		

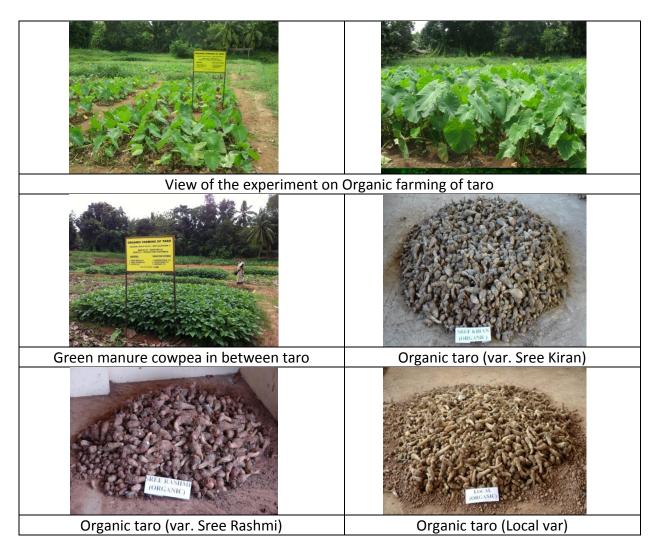
Field preparation: The land is ploughed to a depth of 20-25 cm. Ridges and furrows are formed at 60 cm spacing. Cormels are planted at a spacing of 45 cm on the ridges. The cormels may be planted at a depth of 2.5-7.5 cm. About 37,000 cormels are required to plant one hectare. Approximately 800 kg of cormels is required to plant one hectare.

Yield and Economics

Parameters	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	
	*year							
Economic yield (t/ha)	10.43	16.51	9.71	6.93	9.49	18.18		
Price (Rs/kg) (consider 25 %	Rs. 20/kg							
premium on prevailing market								
price)								
Cost of cultivation (Rs/ha)	Rs. 189420							
Net returns (Rs/ha)	Rs. 1741	60						

^{*}based on prices of 2013-14

Cropping Systems 3: Taro + green manure cowpea



Madhya Pradesh

Prepared by AB Singh, K. Ramesh, S Ramana, JK Thakur and BL Lakaria, ICAR-Indian Institute of Soil science, Bhopal (Madhya pradesh)

Suggested cropping systems (based on testing under NPOF)

- 1. Soybean-Wheat
- 2. Soybean-Mustard
- 3.Soybean-Chickpea
- **4.** Soybean-Isabgol/Linseed

Cropping System 1: Soybean-Wheat

Cropping Dystein 1. Doybean	1 TTIONE	
Particulars	Kharif	Rabi
Crop	Soybean	Wheat
Fortnight of sowing/planting	July Fortnight	2 nd fortnight of November
Fortnight of harvesting	October	2 nd fortnight of March
Varieties suitable for organic	JS-335	Malwa Shakti
farming		

Crop (kharif): Soybean

Important features of suitable varieties

Parameters	Var. JS-335
Duration (days)	95-100
Average yield under organic condition (kg/ha)	1100
Source (s) of availability	M.P. State govt.
Suitable regions/districts in the state	Central Zone (M.P.)
Specific resistance / tolerance to pest	Tolerant to stem fly
Specific resistance / tolerance to disease	Resistant to bacterial blight and
	tolerant to green mosaic
Specific tolerance to drought/waterlogging	Susceptible to water logging

Field preparation: Two ploughings are necessary before sowing. If necessary, broad bed furrow can be made wherever water logging is a problem.

Seed rate (kg/ha) (Not applicable	80		
for nursery crops)			
Pre-sowing/planting treatment of	Rhizobium	5g/kg seed	Seed treatment
seed/seedlings	culture		
	Phosphate	5g/kg seed	Seed treatment
	Solublizing		
	Bacteria		
	(PSB)		

	Trichoderma viride	5 g/kg so	eed	Seed treatment
Spacing (Row X plant) in cm	45 x 5 cm			L
Number of seedlings/hill (in nursery crops only)	NA			
Basal application of organic	Source		Quantity/	ha
manures including soil application of bio-fertilizers, bio-	Cow dung (0.95% Nitroger	manure n)	5 t/ha	
control agents etc				
Irrigation practices	Number of	Most	critical	Depth of irrigation
	irrigations	stages irrigation	for on	(cm)
	Rainfed crop			
Major weeds (give local, English and scientific name)	Doodhi Asthma herb (Euphorbia hirta), Motha Purple nutsedge(Cyperus rotundus),			
Weed management	Critical stage of Recommended practice for organ weeding condition			ractice for organic
	20-30 days after sowing	Hand w	reeding	
Organic plant protection practices	Name of pest/disease	_	material ended for	Quantity (kg or litres/ ha)
	Stem Girdle beetle	Neem or ppm) Azadirac	il (10000 1% htin	1 litre/ ha along with soap solution
	Tobacco caterpillar	Neem or ppm) Azadirac	il (10000 1% htin	1 litre/ ha along with soap solution
Optimum stage of harvesting	Physiological m	aturity eta	ge of souh	ean ean

Optimum stage of harvesting Physiological maturity stage of soybean

Nutrient management –Nutrient were applied through Nitrogen equivalent basis

Yield and Economics

Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic yield (kg/ha)	714	1399	918	1144	2009	2377	1103
Price (Rs/kg) (consider 25 % premium on prevailing market price)	Rs. 37.5/k	g g		1	1		
Cost of	11607/ha						
cultivation*(Rs/ha)							
Net returns* (Rs/ha)	7244/ha						

*based on prices of 2013-14

Yield (Kg/ha)	Cost of Cultivation (Rs/ha)

1100	11607

Crop (Rabi): Wheat

Important features of suitable varieties

Parameters	Malwashakti
Duration (days)	135-140
Average yield under organic condition (kg/ha)	3570
Source (s) of availability	M.P. state Govt.
Suitable regions/districts in the state	Malwa region of M.P.
Specific resistance / tolerance to pest	NA
Specific resistance / tolerance to disease	Resistant to rust
Specific tolerance to drought/waterlogging	NA

Cultural practices

Seed rate (kg/ha) (Not applicable	80-100 kg/ha			
for nursery crops)				
Spacing (Row X plant) in cm	22.5 x 5 cm			
Basal application of organic	Source		Quantity/	ha
manures including soil	Cow dung	manure	4.5 t/ha	
application of bio-fertilizers, bio-	(0.95% Nitrogen))		
control agents etc	Vermicompost	(1.41%	3.5 t/ha	
	Nitrogen)			
	Poultry Manure	(2.36%	1.5 t/ha	
	Nitrogen)			
Irrigation practices	Number of	Most	critical	Depth of irrigation
	irrigations	stages	for	(cm)
	irrigation			
	2-3	Crown	root	
		initiatio	n (21	
		DAS)	,	
Major weeds	Senji yellow sv	weet clo	ver (Melilo	otus indica), Doodhi
	Asthma herb	(Euphor	rbia hirta	a), Motha Purple
	nutsedge(Cyperu			-
	lambsquarter (Chenopodium album)			
Weed management	Critical stage of	Recomi	nended p	ractice for organic
	weeding	condition	on	C
	30-40 days	Hand w	reeding	
	after sowing		J	
Optimum stage of harvesting (in	Physiological ma	turity sta	ge	
case of vegetables and green cob)		•	_	
	11 1 1			

Nutrient management –Nutrient were applied through Nitrogen equivalent basis

Yield and Economics

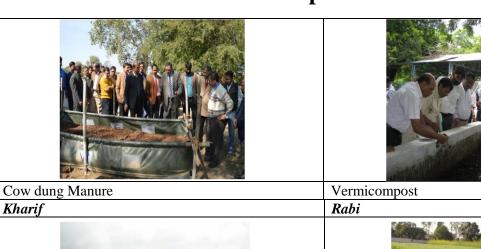
Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th

Economic yield (kg/ha)	4160	4094	4110	4915	4406	3604	3136
Price (Rs/kg) (consider 25 % premium on prevailing market price)	20/ kg						
Cost of cultivation*(Rs/ha)	25171/ha						
Net returns* (Rs/ha)	34399/ha						

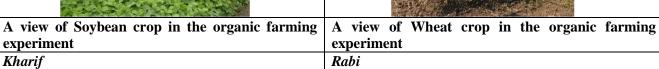
*based on prices of 2013-14

Yield (Kg/ha)	Cost of Cultivation (Rs/ha)
2722.2	11514

Glimpses











Cropping System 2: -Soybean- Mustard

Particulars	Kharif	Rabi

Crop	Soybean	Mustard
Fortnight of sowing/planting	July Fortnight	2 nd fortnight of Octber
Fortnight of harvesting	October	1 st fortnight of March
Varieties suitable for organic	JS-335	Pusa Bold
farming		

Crop (kharif): Soybean

Field preparation: Two ploughings and Broad Bed Furrow if necessary under water logging conditions.

Cultural practices

Seed rate (kg/ha) (Not applicable	80				
for nursery crops)					
Pre-sowing/planting treatment of	Rhizobium	5g/kg seed	Seed treatment		
seed/seedlings	culture				
	Phosphate	5g/kg seed	Seed treatment		
	Solublizing				
	Bacteria				
	(PSB)				
	Trichoderma	g/kg seed	Seed treatment		
	viride				
Spacing (Row X plant) in cm	45 x 5 cm				
Major weeds	Doodhi Asthma herb (Euphorbia hirta), Motha Purple				
	nutsedge (Cyperus rotundus),				
Weed management	Critical stage	_			
	of weeding	condition			
	20-30 days	Hand weeding			
	after sowing				
Organic plant protection	Name of	Organic material	Quantity (kg or		
practices	pest/disease	recommended for	litres/ ha)		
		control			
	Girdle beetle	Neem oil (10000	1 litre/ ha with soap		
		ppm) 1%	solution		
		Azadirachtin			
	Tobacco	Neem oil (10000	1 litre/ ha with soap		
	caterpillar	ppm) 1%	solution		
		Azadirachtin			

Nutrient management –Nutrient were applied through Nitrogen equivalent basis

Yield and Economics

Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic yield (kg/ha)	714	1399	918	1144	2009	2377	1103

Price (Rs/kg) (consider 25	37.5/kg
% premium on prevailing	
market price)	
Cost of	11607/ha
cultivation*(Rs/ha)	
Net returns* (Rs/ha)	7244/ha

^{*}based on prices of 2013-14

Yield (Kg/ha)	Cost of Cultivation (Rs/ha)
1100	11607

Crop (Rabi): Mustard

Cultural practices

Seed rate (kg/ha) (Not applicable	5-6 kg/ha			
for nursery crops)				
Spacing (Row X plant) in cm	45 x 10 cm			
Recommended NPK and micro	NPK -60:17.5:25 kg/ha			
nutrient dose for the crop (kg/ha)				
Basal application of organic	Source Quantity			ha
manures including soil	Cow dung	manure	1.5 t/ha	
application of bio-fertilizers, bio-	(0.95% Nitrogen)		
control agents etc	Vermicompost	(1.41%	1.7 t/ha	
	Nitrogen)			
	Poultry Manure	(2.36%	1 t/ha	
	Nitrogen)			
				,
Irrigation practices	Number of		critical	Depth of irrigation
	irrigations	stages	for	(cm)
	irrigation			
	2		ng stage	5-6 cm
Major weeds	•		rotundus	* *
	1 `	1	,	Doodhi Asthma herb
	(Euphorbia hirta)			
Weed management	Critical stage of			ractice for organic
	weeding	condition		
	15-30 days	Hand w	reeding	
	after sowing			
Organic plant protection	Name of	_	material	Quantity (kg or
practices	pest/disease		ended for	litres/ ha)
		control	11 (10000	4.1% /1 %1
			il (10000	1 litre/ ha with soap
		ppm)	1%	solution
	erysimi)	Azadirac	ntın	

Nutrient management –Nutrient were applied through Nitrogen equivalent basis

Yield and Economics

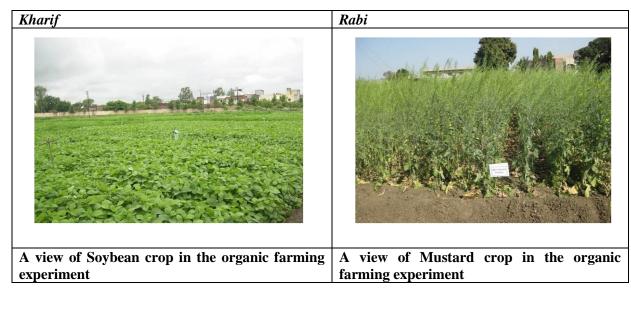
Parameters		1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic	yield	1470	1421	1898	1948	2106	1142	1948
(kg/ha)								
Price	(Rs/kg)	40/ kg						
(consider	25 %							
premium	on							
prevailing	market							
price)								
Cost	of	23691/ha						
cultivation*((Rs/ha)							
Net	returns*	24438/ha			•	•		
(Rs/ha)								

^{*}based on prices of 2013-14

Yield (Kg/ha)	Cost of Cultivation (Rs/ha)
1003.3	10553

Field preparation: Write here about the number of ploughings/harrowing /planking etc in running text and in sequence, Please specifically mention the practices of puddling, making ridges and furrows, raised beds if applicable along with distance also. Also mention about incorporation of green/green leaf manure

Glimpses







Organic Soybean Organic Mustard

Cropping System 3: Soybean-Chickpea

Particulars	Kharif	Rabi
Crop	Soybean	Chickpea
Fortnight of sowing/planting	July Fortnight	2 nd fortnight of October
Fortnight of harvesting	October	March
Varieties suitable for organic	JS-335	JG-130
farming		

Crop (kharif): Soybean

Field preparation: Two ploughings are necessary before sowing. If necessary, broad bed furrow can be made wherever water logging is a problem.

Seed rate (kg/ha) (Not applicable	80				
for nursery crops)					
Pre-sowing/planting treatment of	Rhizobium	5g/kg see	ed	Seed treatment	
seed/seedlings	culture				
	Phosphate	5g/kg see	ed	Seed treatment	
	Solublizing				
	Bacteria				
	(PSB)				
	Trichoderma	g/kg see	d	Seed treatment	
	viride				
Spacing (Row X plant) in cm	45 x 5 cm				
Basal application of organic	Source		Quantity/ha		
manures including soil	Cow dung	manure	5 t/ha		
application of bio-fertilizers, bio-	(0.95% Nitroger	n)			
control agents etc					
Major weeds	Doodhi Asthma herb (Euphorbia hirta), Motha Purp				
	nutsedge(Cyperus rotundus),				
Weed management	Critical stage of	Recomi	nended p	ractice for organic	

			weeding	condition	
			20-30 days	Hand weeding	
			after sowing		
Organic	plant	protection	Name of	Organic material	Quantity (kg or
practices			pest/disease	recommended for	litres/ ha)
			control		
			Girdle beetle	Neem oil (10000	1 litre/ ha with soap
				ppm) 1%	solution
				Azadirachtin	
			Tobacco	Neem oil (10000	1 litre/ ha with soap
			caterpillar	ppm) 1%	solution
			-	Azadirachtin	

Nutrient management –Nutrient were applied through Nitrogen equivalent basis

Yield and Economics

Parameters		1 st *	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic y	ield	714	1399	918	1144	2009	2377	1103
(kg/ha)								
Price (Rs.	/kg)	37.5/kg	<u> </u>		I	<u>I</u>	l	
(consider 25	%							
premium	on							
prevailing ma	rket							
price)								
Cost	of	11607/	ha					
cultivation*(Rs/h	ıa)							
Net returns* (Rs/	ha)	7244/h	a					
Yield (Kg/ha)		Cost of Cultivation (Rs/ha)						
1100				11	607			

Crop (Rabi): Chickpea

Important features of suitable varieties

Parameters	JG-130					
Duration (days)	100-120					
Average yield under organic condition (kg/ha)	1880					
Source (s) of availability	M.P. state Govt.					
Suitable regions/districts in the state	Malwa region of M.P.					
Specific resistance / tolerance to disease	Resistant to fusarium wilt,					
	moderately resistant to dry root rot					
Specific tolerance to drought/waterlogging	Tolerant to helicoverpa					

Field preparation: Two ploughings are necessary before sowing of the crops

Pre-sowing/planting treatment of seed/seedlings	Seed rate (kg/ha) (Not applicable	75-80 kg/ha				
Rhizobium Sg/kg seed Seed treatment	for nursery crops)					
Rhizobium culture Sg/kg seed Seed treatment	Pre-sowing/planting treatment of	Material	Recomm	ended	Method of	
Rhizobium culture Phosphate Solublizing Bacteria (PSB) Trichoderma viride Spacing (Row X plant) in cm Basal application of organic manures including soil application of bio-fertilizers, bio-control agents etc Phousphate Sg/kg seed Seed treatment Source Quantity/ha Cow dung manure 1.7 t/ha (0.95% Nitrogen) Vermicompost (1.41% 1.3 t/ha Nitrogen) Poultry Manre (2.36% 0.5 t/ha Nitrogen) Irrigation practices Number of irrigation stages for irrigation stages for irrigation for irrigation stages for	seed/seedlings		,	g/ha or	application	
culture Phosphate Solublizing Bacteria (PSB) 5g/kg seed Seed treatment Trichoderma viride 2g/kg seed Seed treatment Spacing (Row X plant) in cm 30 x 10 cm Source Quantity/ha Basal application of organic manures including soil application of bio-fertilizers, bio- control agents etc Cow dung manure (0.95% Nitrogen) 1.7 t/ha Vermicompost Poultry Manre irrigations (2.36%) 0.5 t/ha Nitrogen) Poultry Manre irrigation (2.36%) 0.5 t/ha Major weeds Bathua Common lambsquarter irrigation Chenopodium album), Doodhi Asthma herb (Euphorbia hirta), Motha Purple nutsedge(Cyperus rotundus),Doob grass Bermuda grass (Cynodon dactylon) Weed management Critical stage of weeding Recommended condition practice for organic condition						
Phosphate Sg/kg seed Seed treatment			5g/kg see	ed	Seed treatment	
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Weed management Critical stage of Recommended practice for organic weeding condition 30 days after Hand weeding				,,	<i>5</i>	
weeding condition 30 days after Hand weeding	Weed management			mended p	ractice for organic	
30 days after Hand weeding				_		
			Hand w	eeding		
		sowing				

Nutrient management –Nutrient were applied through Nitrogen equivalent basis

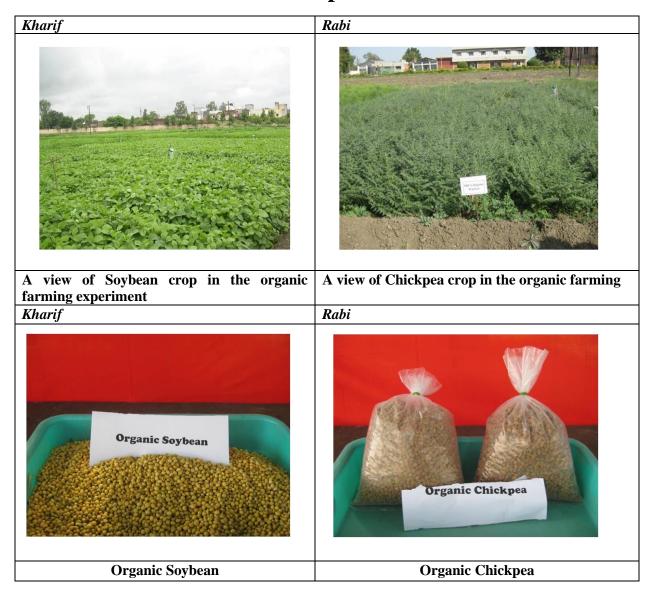
Yield and Economics

Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic yield (kg/ha)	1736	1480	1720	1890	3348	1821	2018
Price (Rs/kg) (consider 25 %	37.5/ kg	I	I	I	I	I	<u> </u>

premium on prevailing	
market price)	
Cost of cultivation*(Rs/ha)	24130/ha
Net returns* (Rs/ha)	34031/ha
Yield (Kg/ha)	Cost of Cultivation (Rs/ha)
1477.8	11516

^{*}based on prices of 2013-14

Glimpses



Cropping System 4: Soybean-Linseed

Particulars	Kharif	Rabi		
Crop	Soybean	Linseed		
Fortnight of sowing/planting	July Fortnight	1 st fortnight of October		
Fortnight of harvesting	October	March		

Varieties suitable for organic	JS-335	JL-9
farming		

Crop (kharif): Soybean

Important features of suitable varieties

Parameters	JS-335
Duration (days)	95-100
Average yield	1100
under organic	
condition (kg/ha)	
Source (s) of	M.P. State govt.
availability	
Suitable	Central Zone (M.P.)
regions/districts in	
the state	
Specific resistance	Tolerant to stem fly
/ tolerance to pest	
Specific resistance	Resistant to bacterial blight and tolerant to green mosaic
/ tolerance to	
disease	

Field preparation: Two ploughings are necessary before sowing. If necessary, broad bed furrow can be made wherever water logging is a problem.

Seed rate (kg/ha) (Not applicable	80					
for nursery crops)						
Pre-sowing/planting treatment of	Rhizobium	5g/kg seed Seed treatment				
seed/seedlings	culture					
	Phosphate	5g/kg seed	Seed treatment			
	Solublizing					
	Bacteria					
	(PSB)					
	Trichoderma	g/kg seed	Seed treatment			
	viride					
Spacing (Row X plant) in cm	45 x 5 cm					
Source	Quantity/ha					
Cow dung manure (0.95%	5 t/ha					
Nitrogen)						
Major weeds	Doodhi Asthma	a herb (Euphorbia	hirta), Motha Purple			
	nutsedge(Cyperus rotundus),					
Weed management	Critical stage of Recommended practice for organic					
	weeding	eeding condition				
	20-30 days	Hand weeding				
	after sowing					
Organic plant protection	Name of	Organic material	Quantity (kg or			

practices	pest/disease	recommended for	litres/ ha)
		control	
	Girdle beetle	Neem oil (10000	1 litre/ ha with soap
		ppm) 1%	solution
		Azadirachtin	
	Tobacco	Neem oil (10000	1 litre/ ha with soap
	caterpillar	ppm) 1%	solution
	_	Azadirachtin	

Yield and Economics

1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
714	1399	918	1144	2009	2377	1103
37.5/kg						
11607/ha						
7244/ha						
	C	ost of Cu	ıltivatioı	n (Rs/ha))	
	11	1607				
	714 37.5/kg 11607/ha	714 1399 37.5/kg 11607/ha 7244/ha	714 1399 918 37.5/kg 11607/ha 7244/ha	714 1399 918 1144 37.5/kg 11607/ha 7244/ha Cost of Cultivation	714 1399 918 1144 2009 37.5/kg 11607/ha Cost of Cultivation (Rs/ha)	714 1399 918 1144 2009 2377 37.5/kg

^{*}based on prices of 2013-14

Crop (Rabi): Linseed

Important features of suitable varieties

Parameters	JL-9
Duration (days)	115-120
Average yield under organic condition (kg/ha)	1300
Source (s) of availability	M.P. state Govt.
Suitable regions/districts in the state	Sagar, Damoh Tikamgerh district of
	M.P.
Specific resistance / tolerance to disease	Resistant to powdery mildew

Field preparation: Two ploughings are necessary before sowing of the crops

Seed rate (kg/ha) (Not applicable	25-30 kg/ha	
for nursery crops)		
Spacing (Row X plant) in cm	30 x 5 cm	
Basal application of organic	Source	Quantity/ha

manures including soil	Cow dung	manure	3.4 t/ha	
application of bio-fertilizers, bio-	(0.95% Nitrogen))		
control agents	Vermicompost	(1.41%	1.7 t/ha	
	Nitrogen)			
	Poultry Manre	(2.36%	1 t/ha	
	Nitrogen)			
Irrigation practices	Number of	Most	critical	Depth of irrigation
	irrigations	stages	for	(cm)
		irrigatio	on	
	2	30 da	ay after	
		sowing		
Major weeds	Bathua Common	n lambso	quarter (Cl	henopodium album),
	Doodhi Asthma	herb (Euphorbia	hirta), Doob grass
	Bermuda grass (Cynodon	dactylon)	
Weed management	Critical stage of	Recom	mended p	ractice for organic
	weeding	condition	on	
	20-30 days	Hand w	eeding	
	after sowing			

Nutrient management –Nutrient were applied through Nitrogen equivalent basis

Yield and Economics

Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic yield (kg/ha)	1823	1080	1228	1392			
Price (Rs/kg) (consider 25 % premium	42.5/ kg						
on prevailing market price)							
Cost of cultivation*(Rs/ha)	23922/ha						
Net returns* (Rs/ha)	39249/ha						
Yield (Kg/ha)	Cost of Cultivation (Rs/ha)						
1392.6	10864						

^{*}based on prices of 2013-14

Glimpses

Kharif



A view of Soybean crop in the organic farming experiment

A view of linseed crop in the organic farming experiment







Organic Soybean

Organic Linseed

Cropping System: Soybean-Isbgol

Particulars	Kharif	Rabi
Crop	Soybean	Isbgol
Fortnight of sowing/planting	July Fortnight	1 st week of December
Fortnight of harvesting	October	March
Varieties suitable for organic	JS-335	GI-2
farming		

Crop (kharif): Soybean

Important features of suitable varieties

Parameters	JS-335
Duration (days)	95-100
Average yield under organic condition (kg/ha)	1100
Source (s) of availability	M.P. State govt.

Suitable regions/districts in the state	Central Zone (M.P.)		
Specific resistance / tolerance to pest	Tolerant to stem fly		
Specific resistance / tolerance to disease	Resistant to bacterial blight and tolerant to green mosaic		

Field preparation: Two ploughings are necessary before sowing. If necessary, broad bed furrow can be made wherever water logging is a problem.

Cultural practices

Seed rate (kg/ha)	80			
Pre-sowing/planting treatment of	Rhizobium	5g/kg seed		Seed treatment
seed/seedlings	culture			
	Phosphate	5g/kg see	ed	Seed treatment
	Solublizing			
	Bacteria			
	(PSB)			
	Trichoderma	g/kg see	d	Seed treatment
	viride			
Spacing (Row X plant) in cm	45 x 5 cm		T	
Basal application of organic	Source		Quantity/	ha
manures including soil	Cow dung	manure	5 t/ha	
application of bio-fertilizers, bio-	(0.95% Nitroge	<u>n)</u>		
control agents etc				
25.	D 11 : A 1	1 1 (1		
Major weeds		,		hirta), Motha Purple
337 1	nutsedge(Cyper			· · · · ·
Weed management	Critical stage of	condition	_	ractice for organic
	weeding			
	20-30 days	Hand w	eeding	
Organia plant protection	after sowing Name of	Organia	material	Overtity (Iza en
Organic plant protection			ended for	Quantity (kg or litres/ ha)
practices	pest/disease	control	ended for	ntres/ na)
	Girdle beetle	Neem o	il (10000	1 litre/ ha with soap
		ppm)	1%	solution
		Azadirac	htin	
	Tobacco	Neem o	il (10000	1 litre/ ha with soap
	caterpillar	ppm)	1%	solution
		Azadirac	htin	

Nutrient management -Nutrient were applied through Nitrogen equivalent basis

Yield and Economics

1 st *year	2 nd	3 rd	4 ^t	5 th	6 th	7 th
714	1399	918	1144	2009	2377	1103
37.5/kg	l	l				•
11607/ha						
7244/ha						
	Cost	of Culti	ivation	(Rs/ha)		
	44.60=					
	11607					
	37.5/kg 11607/ha	714 1399 37.5/kg 11607/ha 7244/ha Cost (714 1399 918 37.5/kg 11607/ha 7244/ha	714 1399 918 1144 37.5/kg 11607/ha 7244/ha Cost of Cultivation	714 1399 918 1144 2009 37.5/kg 11607/ha 7244/ha Cost of Cultivation (Rs/ha)	714 1399 918 1144 2009 2377 37.5/kg 11607/ha 7244/ha Cost of Cultivation (Rs/ha)

^{*}based on prices of 2013-14

Crop (Rabi): Isbgol

Important features of suitable varieties

Parameters	GI-2		
Duration (days)	115-120		
Average yield under organic condition (kg/ha)	1200		
Suitable regions/districts in the state	Neemuch Mandsour and ratlam		
	district of M.P.		
Specific resistance / tolerance to disease	Resistant to fusarium wilt,		
	moderately resistant to dry root rot		
Specific tolerance to drought/waterlogging	Tolerant to helicoverpa		

Field preparation: Two ploughings are necessary before sowing of the crops

Seed rate (kg/ha)	4-5 kg/ha			
Spacing (Row X plant) in cm	30 x 5 cm			
Basal application of organic	Source	Quantity/ha		
manures including soil	Cow dung manure (0.95%	1.2 t/ha		
application of bio-fertilizers, bio-	Nitrogen)			
control agents etc	Vermicompost (1.41%	0.6 t/ha		
_	Nitrogen)			
	Poultry Manure (2.36%	0.3 t/ha		
	Nitrogen)			
Irrigation practices	Number of Most critical stages for irrigation			
	irrigations			
	3-4 Immedi	ate light irrigation after sowing		
Major weeds	Bathua Common lambsquar	rter (Chenopodium album), Doodhi		
	Asthma herb (Eupho	rbia hirta), Motha Purple		
	nutsedge(Cyperus rotundu	is),Doob grass Bermuda grass		
	(Cynodon dactylon)			
Weed management	Critical stage of Recomm	nended practice for organic		
	weeding condition	on		

	Hand weeding		
sowing			
Name of	Organic material	Quantity (kg or litres/	
pest/disease	recommended for	ha)	
	control		
White Grub	Neem oil (10000	1 litre/ ha with soap	
	ppm) 1%	solution	
	Azadirachtin		
	Name of pest/disease	Name of Organic material recommended for control White Grub Neem oil (10000 ppm) 1%	

Nutrient management –Nutrient were applied through Nitrogen equivalent basis

Yield and Economics

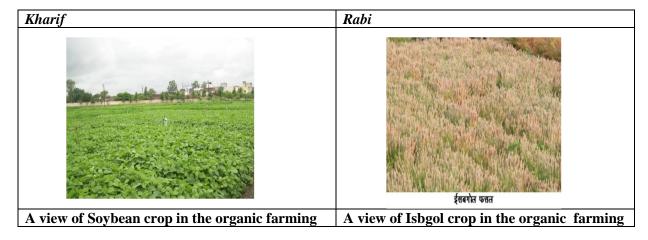
Parameters		1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic	yield	1180	1126	1226	1249			
(kg/ha)								
Price	(Rs/kg)	55/ kg						
(consider	25 %							
premium	on							
prevailing	market							
price)								
Cost	of	20716/ha						
cultivation*(I	Rs/ha)							
Net returns*	(Rs/ha)	33657/ha						

^{*}based on prices of 2013-14

Details of Specific Practices/products used/recommended

(Please give details of panchagavvya, cow urine, BD preparation and any other ITK products including its method of preparation etc)

Glimpses



Maharashtra

Package of practices for Organic Crop Production

Prepared by Dr. L. S. Chavan, Dr. D. G. Jondhle, S. J. Mhatre, S. S.More and S. K. Kshirsagar.

Suggested cropping systems (based on testing under NPOF)

- 1. Rice-Groundnut
- 2. Rice-Dolichos bean
- 3. Rice-Cucumber
- 4. Rice-Red pumpkin

Details of Cropping Systems: 1: Rice – Groundnut

Particulars	Kharif	Rabi
Crop	Rice	Groundnut
Fortnight of sowing/planting	Nursery Sowing -Second	Sowing - Second fortnight
	fortnight of June	of December
	Transplanting- Second	
	fortnight of July	
Fortnight of harvesting	Second fortnight of October	Second fortnight of April
Varieties suitable for	Karjat-3, Karjat-4, Karjat-7 and	SB-XI, Konkan Guarav and
organic farming	Palghar-1	Konkan Trombay Tapora

Crop (Kharif): Rice

Important features of suitable varieties

Parameters	Karjat-3	Karjat-4	Karjat-7	Palghar-1
Duration (days)	115-120	110-115	115-120	125-130
Average yield under organic condition (kg/ha)	3500 to 3700	3300 to 3500	3400 to 3600	3900 to 4100
Source (s) of availability	RARS, Karjat	RARS, Karjat	RARS, Karjat	RARS, Karjat
Suitable regions/districts in the state	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in Maharashtra.	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in <i>Konkan</i> region of Maharashtra.	Suitable for rainfed uplands and irrigated transplanted conditions in Maharashtra State.	Konkan region and Maharashtra state
Specific	Tolerant to stem	Moderately	Resistant to leaf	Moderately
resistance/tolerance	borer	resistant to	folder,	resistant to

to pest		leaf folder	BPH,WBPH	stem borer
			and moderately	
			resistant to stem	
			borer	
Specific	Resistant to blast		Moderately	Moderately
resistance/tolerance	and moderately		resistant to blast	resistant to
to disease	resistant to BLB		and BLB	blast
	and brown spots.			
Specific tolerance to	Suitable for high	Suitable for	Suitable for	Suitable for
drought/water	rainfall zone	high rainfall	high rainfall	high rainfall
logging		zone	zone	zone

Nursery raising practices

	1					
Area of nursery required for	$0.10 \text{ ha} (1000\text{m}^2)$					
1 ha						
Nursery raising method	Wet nursery/Mat nursery/Raised bed method etc.					
Bed size (length x breadth	Length as per slo	ope of the land (slopp	by land less length, plane			
in m)	land more length	n) - Breadth- 1 m				
Seed sowing rate/m ²	45 to 50 g/m ²					
Pre-sowing seed/soil	Materials	Quantity/kg of	Method of application			
treatment		seed or per m ²				
		area				
	Trichoderma	5g/kg of seed	Seed treatment			
Source and optimum	Materials	Quantity/m ² area	Method of application			
quantity of organic						
manures/other nutrient	FYM	3 kg/m ² area	Soil incorporation			
source/m ² of nursery			before nursery sowing			
Irrigation practices	Rainfed		,			
Weed management	Mulching of <i>Gly</i>	ricidia green leaves	and mannual hand			
	weeding	C				
Organic plant protection	Name of	Recommended	Quantity/m ² area			
practices	pest/disease	organic material				
	-	used for control				
	Different	Application of	1500 ppm@5 ml/lit of			
	insect pests	neem formulation	water for two times			
Optimum age of nursery	22 to 26 days	<u>'</u>	<u>'</u>			
(days)						
T7' 1 1						

Field preparation:

Field is ploughed for solar heating in the month of May. Second ploughing and clod crushing is done before monsoon with wooden plough or tractor or power tiller drawn cultivator. Puddling is done by wooden plough or tractor or power tiller drawn puddler. Bullock drawn *Pankaj* puddler developed by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli should be used for better puddling.

The field should be mannured with FYM and Neem cake @ 5 and 0.5 tonnes/ha, respectively before puddling. Similarly, 4.5 tonnes/ ha of *Glyricidia* green leaf and 4.2 tonnes/ha of rice straw be incorporated into puddled field prior to transplanting.

Pre-sowing/planting treatment of seed/seedlings	Material	Recomm rate (kg lit./l	g/ha or	Method of application	
	Phosphate	PSB 2.5 k	(g +	Seedling root dip for	
	solubilizing	Azospirill		20 to 30 minutes in	
	bacteria (PSB)	kg + 100	lit of	the slurry	
	and <i>Azospirillum</i>	water/ha			
Spacing (Row x Plant) in cm)x15cm		
Number of seedlings/hill			edlings/h		
Basal application of organic	Source	!		Quantity/ha	
manures including soil application of bio-fertilizers,	FYM			/ha before puddling	
bio-control agents etc.	Neem cake		500 kg	/ha before puddling	
	Glyricidia Green	*		g /ha soil incorporation ransplanting	
	Rice straw			kg /ha soil incorporation re transplanting	
Top dressing of organic	Source	Quanti		Days after	
manures			,	sowing/planting or stage of crop	
1.	Cow urine	50 lit/ha		Spraying at 30 and 60	
2.	Vermiwash	50 lit/ha		days after transplanting	
Irrigation practices	Rainfed during <i>K</i>	harif and ca	anal irriga	ation during <i>Rabi</i>	
Major weeds	Echinochloa crus	<i>galli</i> (Phak	had), Ec	hinochloa colonum	
	(Phakhad), Cype	rus iria (La	ıvala), <i>C</i> y	perus rotundus (Lavala)	
	and Ischane globossa (Dhur)				
Weed management	Critical stage of weeding			commended practice	
	20.7			organic condition	
	20 Days after transplanting			no- weeder hoeing	
	30 Days after transplanting			no- weeder hoeing and	
	(Tillering)			nual hand weeding	
	60 Days after tra		Ma	nual hand weeding	
	(Panicle initiation	ı)			

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control		
Insect pests	Stem borer	 Ploughing and collection of stubbles and their composting after harvesting of rice. Use of tolerant and resistant varieties. Crop rotation with ground nut, <i>Dolichos</i> 		

	Case worm	 bean, cucumber and red pumpkin. Harvesting of rice close to the ground with <i>Vibhav</i> sickle developed by DBSKKV; Dapoli to kill the hibernating larvae. Use of pheromone traps @20 Nos./ha Release of <i>Trichogramma</i> @ 50000/ha for 4 times. Collection of egg masses and their destruction. Conservation and preservation of frogs in the field
	Case worm	 Timely transplanting Intermittent draining out water from the field Flooding the field followed by dragging a rope across the field and draining out the water from the field
	Brown Plant Hoppers (BPH), White Backed Plant Hoppers (WBPH) and Blue beetle	 Use of tolerant and resistant varieties. Intermittent draining out water from the field Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm) Formation of alley ways for every three meters for penetration of sunlight and proper aeration
	Army worm	 Deep ploughing after harvesting of crop to expose the hibernating stages of pest. Everyday inspection of the field during dry spell and at maturity. Keeping the bunds clean and free of weed in the beginning of the season. Digging the trench and flooding it with water for preventing migration of larvae from one field to another field. Erection of bird perches. Harvesting the crop immediately after it attains the maturity. Conservation and preservation of frogs in the field.
	Leaf eating caterpillars	Erection of bird perches.
Diseases	Blast and sheath rot	 Use of tolerant and resistant varieties. Spraying of <i>Pseudomonas fluroscence</i> @ 8-10 g / lit of water [for 2-3 times] starting from maximum tillering to flowering stage.
	Bacterial leaf blight	 Use of tolerant and resistant varieties. Intermittent draining out water from the field. Judicious use of nitrogenous fertilizers.

Adoption of proper spacing (20x15cm)	
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Yield and economics: q/ha

Parameters	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	201	3-14
Economic							Grain	Straw
yield	1960	2873	3150	3543	3411	3842	3418	4032
(kg/ha)							3410	4032
Price (Rs/kg	g)							
consider 259	%			Caoin .	Da 16 00/lz	~		
Premium on		Grain: Rs.16.88/kg						
prevailing m	narket	Straw: Rs. 2.50/kg						
price								
Cost of culti	vation	82327						
(Rs/ha)		02321						
Net Returns	(Rs/ha)			-	14577			

^{*}based on prices of 2013-14

Crop (Rabi): **Groundnut**

Important features of suitable varieties: SB XI, Konkan Guarav and Konkan Trombay Tapora

Parameters	SB-XI	Konkan Guarav	Konkan Trombay Tapora
Duration (days)	110-115	120-125	120-125
Average yield under	1200 to 1500	1800 to 2000	1900 to 2100
organic condition			
(kg/ha)			
Source (s) of	RARS, Karjat	RARS, Karjat	RARS, Karjat
availability	-		-
Suitable	Maharashtra	Konkan region	Konkan region of
regions/districts in the	state	of Maharashtra	Maharashtra
state			
Specific	Tolerant to	Tolerant to tikka	Tolerant to <i>tikka</i> (leaf spot)
resistance/tolerance to	tikka (leaf spot)	(leaf spot) and	and rust
disease	and rust	rust	

Field preparation:

Plough the field after harvest of *Kharif* rice. Criss-cross cultivation and clod crushing with peg tooth cultivator to bring the soil into good tilth.

Seed rate (kg/ha)	SB XI- 95 kg kernels/ha, Konkan Guarav- 110 kg					
	kernels /ha, Ko i	kernels /ha, Konkan Trombay Tapora- 125 kg				
	kernels/ha					
Pre-sowing/planting treatment of	Material Recommended Method of					
seed/seedlings	rate (kg/ha or application					
_		lit./ha)				
	Trichoderma	5g/kg of seed	Seed treatment			

	Rhizobium strain	25g/ kg of s	seed	Seed treatment	
	PSB	25g/ kg of s	seed	Seed treatment	
Spacing (Row x Plant) in cm		30x15cm			
Basal application of organic	Sour	ce		Quantity/ha	
manures including soil application	FYN	M		1500 kg/ha	
of bio-fertilizers, bio-control agents	Neem	cake		160 kg/ha	
etc.	Vermico	mpost		560 kg/ha	
Top dressing of organic manures	Source	Quantit	y/ha	Days after	
				sowing/planting	
				or stage of crop	
1.	Cow urine	50 lit/	ha	Spraying at 30	
2.	Vermiwash	50 lit/	ha	and 60 days	
				after sowing	
Irrigation practices	Number of	Most critical		Depth of	
	_ , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			1	
S F	irrigation	stage of irr		irrigation (cm)	
S F				_	
S F	irrigation	stage of irr		irrigation (cm)	
S F	irrigation 10 irrigations	stage of irr Branching, Flowering, Pegging, Po	rigation	irrigation (cm) 60 cm	
S F	irrigation 10 irrigations at an interval	stage of irr Branching, Flowering,	rigation	irrigation (cm) 60 cm (6 cm/	
S F	irrigation 10 irrigations at an interval	stage of irr Branching, Flowering, Pegging, Po	rigation	irrigation (cm) 60 cm (6 cm/	
Major weeds	irrigation 10 irrigations at an interval	stage of irr Branching, Flowering, Pegging, Po formation a Pod filling	rigation od nd	60 cm (6 cm/ irrigation)	
	irrigation 10 irrigations at an interval of 10-12 days	stage of irr Branching, Flowering, Pegging, Poformation a Pod filling a (Ranpopati	od nd), <i>Portula</i>	60 cm (6 cm/ irrigation)	
	irrigation 10 irrigations at an interval of 10-12 days	stage of irr Branching, Flowering, Pegging, Poformation a Pod filling a (Ranpopatialternanthera	od nd), Portula sessilis (60 cm (6 cm/ irrigation)	
	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera ((Ranti math)	stage of irr Branching, Flowering, Pegging, Po formation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar	od nd), Portula sessilis (60 cm (6 cm/ irrigation)	
	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera	stage of irr Branching, Flowering, Pegging, Po formation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar	od nd), Portula sessilis (nd Amara	irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata), anthus viridis nended practice	
Major weeds	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera ((Ranti math) Critical stage of	stage of irr Branching, Flowering, Pegging, Poformation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar of weeding	od and), Portula sessilis (and Amara Recomm	irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata), anthus viridis mended practice mic condition	
Major weeds	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera ((Ranti math)	stage of irr Branching, Flowering, Pegging, Poformation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar of weeding	od nd), Portula sessilis (nd Amara Recomn for orga	irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata), unthus viridis nended practice inic condition v land weeder	
Major weeds	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera ((Ranti math) Critical stage of	stage of irr Branching, Flowering, Pegging, Po formation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar of weeding	od and od sessilis (and Amara Dry Manua	irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata), anthus viridis mended practice mic condition	

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control	Quantity (kg or liters/ha)
Insect pests	Aphids	Application of neemicide	3ml/lit
	Tikka (leaf spot)	Use of tolerant and resistant varieties.	
	Rust	• Use of tolerant and resistant varieties.	
		 Judicious use of irrigation. Timely	

			harvesting.	
Optimum stage of harvesting	•	General yello	wing of crop.	
	•	Blackening of	f inside portion of shell.	
	•	Development	of ridges on pod	
	•	Colour develo	opment of kernel as per	varietal
		character.	-	

Yield and economics: q/ha

Parameters	2007- 08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	
Economic yield (kg/ha)	1671	3395	3648	2881	2584	2546	1876	
Price (Rs/kg) consider 25% Premium on prevailing market price		Rs.75/kg						
Cost of cultivation (Rs/ha)		74333						
Net Returns (Rs/ha)	66367							

^{*}based on prices of 2013-14

Rice-Groundnut cropping system economics:

Gross Returns (Rs/ha)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
208450	156660	51790	1.33

Cropping System 2: Rice-Dolichos bean

Details of Cropping Systems

Particulars	Kharif	Rabi
Crop	Rice	Dolichos bean
Fortnight of	Nursery Sowing -Second	Sowing - Second fortnight
sowing/planting	fortnight of June	of December
	Transplanting- Second	
	fortnight of July	
Fortnight of harvesting	Second fortnight of October	First fortnight of February to
		second fortnight of March
Varieties suitable for	Karjat-3, Karjat-4, Karjat-7 and	Konkan Bhushan
organic farming	Palghar-1	Konkan Dhushan

Crop (Kharif): Rice

Important features of suitable varieties

Parameters	Karjat-3	Karjat-4	Karjat-7	Palghar-1

Duration (days)	115-120	110-115	115-120	125-130
Average yield under organic condition (kg/ha)	3500 to 3700	3300 to 3500	3400 to 3600	3900 to 4100
Source (s) of availability	RARS, Karjat	RARS, Karjat	RARS, Karjat	RARS, Karjat
Suitable regions/districts in the state	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in Maharashtra.	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in <i>Konkan</i> region of Maharashtra.	Suitable for rainfed uplands and irrigated transplanted conditions in Maharashtra State.	Konkan region and Maharashtra state
Specific resistance/toleran ce to pest	Tolerant to stem borer	Moderately resistant to leaf folder	Resistant to leaf folder, BPH,WBPH and moderately resistant to stem borer	Moderately resistant to stem borer
Specific resistance/toleran ce to disease	Resistant to blast and moderately resistant to BLB and brown spots.		Moderately resistant to blast and BLB	Moderately resistant to blast
Specific tolerance to drought/water logging	Suitable for high rainfall zone	Suitable for high rainfall zone	Suitable for high rainfall zone	Suitable for high rainfall zone

Nursery raising practices

Area of nursery required	0.10 ha (1000n	n^2)		
for 1 ha				
Nursery raising method	Wet nursery /Mat nursery/Raised bed method etc.			
Bed size (length x breadth	Length as per s	lope of the land (slo	oppy land less length, plane	
in m)	land more leng	th) - Breadth- 1 m		
Seed sowing rate/m ²	45 to 50 g/m ²			
Pre-sowing seed/soil	Materials	Quantity/kg of	Method of application	
treatment		seed or per m ²		
		area		
	Trichoderma	5g/kg of seed	Seed treatment	
Source and optimum quantity of organic	Materials	Quantity/m ² area	Method of application	
manures/other nutrient source/m ² of nursery	FYM	3 kg/m ² area	Soil incorporation before nursery sowing	

Irrigation practices	Rainfed			
Weed management	Mulching of <i>Glyricidia</i> green leaves and mannual hand weeding			
Organic plant protection practices	Name of pest/disease	Recommended organic material used for control	Quantity/m ² area	
	Different insect pests	Application of neem formulation	1500 ppm@5 ml/lit of water for two times	
Optimum age of nursery (days)	22 to 26 days			

Field preparation:

Field is ploughed for solar heating in the month of May. Second ploughing and clod crushing is done before monsoon with wooden plough or tractor or power tiller drawn cultivator. Puddling is done by wooden plough or tractor or power tiller drawn puddler. Bullock drawn *Pankaj* puddler developed by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli should be used for better puddling.

The field should be mannured with FYM and Neem cake @ 5 and 0.5 tonnes/ha, respectively before puddling. Similarly, 4.5 tonnes/ ha of *Glyricidia* green leaf and 4.2 tonnes/ha of rice straw be incorporated into puddled field prior to transplanting.

Pre-sowing/planting treatment of seed/seedlings	Material Recommended rate (kg/ha or lit./ha)		Method of application			
	Phosphate solubilizing bacteria (PSB) and Azospirillum	PSB 2.5 kg + Azospirillum 2.5 kg + 100 lit of water/ha		Azospirillum 2.5 kg		Seedling root dip for 20 to 30 minutes in the slurry
Spacing (Row x Plant) in cm	20x15cm					
Number of seedlings/hill (in nursery crop only)		3-4 seed	lings/hill			
Basal application of	Source		(Quantity/ha		
organic manures including soil application	FYM		5000 kg /h	kg /ha before puddling		
of bio-fertilizers, bio-	Neem cake		500 kg/h	ha before puddling		
control agents etc.	Glyricidia Green leav	'es	4500 kg /ha soil incorporation before transplanting			
	Rice straw 4200 kg /ha s before transpla			/ha soil incorporation		
Top dressing of organic manures	Source	Quan	tity/ha	Days after sowing/planting or stage of crop		

1.	Cow urine	50 lit/ha		Spraying at 30 and	
				60 days after	
2.	Vermiwash	50 lit/ha		transplanting	
Irrigation practices	Rainfed during Khari	f and canal:	irrigation d	uring <i>Rabi</i>	
Major weeds	Echinochloa crusgall	i (Phakhad)	, Echinoch	loa colonum	
	(Phakhad), Cyperus i	<i>ria</i> (Lavala), Cyperus i	rotundus (Lavala)	
	and Ischane globossa (Dhur)				
Weed management	Critical stage of wee	ding	Recomme	ended practice for	
			organic co	ondition	
	20 Days after transpla	inting	Cono- wee	eder hoeing	
	30 Days after transpl	anting	Cono- wee	eder hoeing and	
	(Tillering) manual ha		(Tillering) manual hand weeding		nd weeding
	60 Days after transpl	anting	Manual ha	and weeding	
	(Panicle initiation)				

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control
Insect pests	Stem borer	 Ploughing and collection of stubbles and their composting after harvesting of rice. Use of tolerant and resistant varieties. Crop rotation with ground nut, <i>Dolichos</i> bean, cucumber and red pumpkin. Harvesting of rice close to the ground with <i>Vibhav</i> sickle developed by DBSKKV; Dapoli to kill the hibernating larvae. Use of pheromone traps @20 Nos./ha Release of <i>Trichogramma</i> @ 50000/ha for 4 times. Collection of egg masses and their destruction. Conservation and preservation of frogs in the field
	Case worm	 Timely transplanting Intermittent draining out water from the field Flooding the field followed by dragging a rope across the field and draining out the water from the field
	Brown Plant Hoppers (BPH), White Backed Plant Hoppers (WBPH) and Blue beetle	 Use of tolerant and resistant varieties. Intermittent draining out water from the field Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm) Formation of alley ways for every three meters for penetration of sunlight and proper aeration

Army worm	 Deep ploughing after harvesting of crop to
	expose the hibernating stages of pest.

		 Everyday inspection of the field during dry spell and at maturity. Keeping the bunds clean and free of weed in the beginning of the season. Digging the trench and flooding it with water for preventing migration of larvae from one field to another field. Erection of bird perches. Harvesting the crop immediately after it attains the maturity. Conservation and preservation of frogs in the field.
	Leaf eating caterpillars	Erection of bird perches.
Diseases	Blast and sheath rot	 Use of tolerant and resistant varieties. Spraying of <i>Pseudomonas fluroscence</i> @ 8-10 g / lit of water [for 2-3 times] starting from maximum tillering to flowering stage.
	Bacterial leaf blight	 Use of tolerant and resistant varieties. Intermittent draining out water from the field. Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm)

Yield and economics: q/ha

Parameters	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	20	13-14	
Economic							Grai	Straw	
yield (kg/ha)	3148	2050	3940	2700	2780	3558	n	Suaw	
							3324	3921	
Price (Rs/kg) consider		Crain, Do 16 99/kg							
25% Premium	on	Grain: Rs.16.88/kg							
prevailing market price		Straw: Rs. 2.50/kg							
Cost of cultivation		82327							
(Rs/ha)		02321							
Net Returns (Rs/ha)		-16440							

^{*}based on prices of 2013-14

Crop (Rabi): Dolichos bean

Important features of suitable varieties: Konkan Bhushan

Parameters	Variety: Konkan Bhushan
Duration (days)	100 days
Average yield under organic condition (kg/ha)	5000-5200 green pods kg/ha
Source (s) of availability	RARS, Karjat

Suitable regions/districts in the state	Maharashtra state
Specific resistance/tolerance to disease	Resistant to yellow mosaic virus
Special character	Dwarf, Does not require support

Field preparation:

Plough the field after harvest of *Kharif* rice. Criss-cross cultivation and clod crushing with peg tooth cultivator to bring the soil into good tilth.

Seed rate (kg/ha)	25kg/ha			
Pre-sowing/planting treatment of	Material Recommended			Method of
seed/seedlings		rate (kg/ha or		application
		lit./ha	/	
	Trichoderma	5g/kg of se	ed	Seed treatment
	Rhizobium	25g/kg of so	eed	Seed treatment
	strain			
	PSB	25g/kg of so	eed	Seed treatment
Spacing (Row x Plant) in cm		45 x 15	cm	
Basal application of organic	Sour	ce		Quantity/ha
manures including soil application	FYN	M		4000 kg/ha
of bio-fertilizers, bio-control agents	Neem	cake		390 kg/ha
etc.	Vermico	mpost		1330 kg/ha
Top dressing of organic manures	Source	Quantity	/ha	Days after
				sowing/planting
				or stage of crop
1.	Cow urine	50 lit/ł		Spraying at 30
2.	Vermiwash	50 lit/h	ıa	and 60 days
				after sowing
Irrigation practices	Number of	Most crit		Depth of
	irrigation	stage of irri		irrigation (cm)
	9 irrigations	Branchi	_	54 cm
		Flowering a		(6 cm/irrigation)
		formati		
Major weeds	Physalis minime			
	(Motha ghol), Alternanthera sessilis (Reshimkata),			
	Blumea lacera (Bhamrud) and Amaranthus viridis			
	(Ranti math)			
Weed management	for			nended practice
			for organic condition	
	25-40 DAS		Dry land weeder, One	
			hand weeding	

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control	Quantity (kg or liters/ha)
Insect pests	Aphids	 Application of 	3ml/lit

		neemicide	
	Pod borer	 Application of 	3ml/lit
		neemicide	
Diseases	Powdery • Use of resistant and toler		d tolerant
	mildew	varieties.	
Optimum stage of harvesting	Picking for green pods from 60 to 100 days after		
	sowing		

Yield and economics:

Parameters	2007- 08	2008- 09	2009-10	2010-11	2011- 12	2012-13	2013-14
Economic yield (kg/ha)	5024	2998	3017	1904	4949	5627	4974
Price (Rs/kg) consider 25% Premium on prevailing market price	Rs. 37.50/kg						
Cost of cultivation (Rs/ha)	131093						
Net Returns (Rs/ha)	55432						

^{*}based on prices of 2013-14

Rice-Dolichos bean cropping system economics :

Gross Returns (Rs/ha)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
252412	213420	38992	1.18

Cropping Systems: 3: Rice – Cucumber

Particulars	Kharif	Rabi
Crop	Rice	Cucumber
Fortnight of	Nursery Sowing -Second	Sowing – First fortnight of
sowing/planting	fortnight of June	January
	Transplanting- Second	
	fortnight of July	
Fortnight of harvesting	Second fortnight of October	First fortnight of March to
		first fortnight of April
Varieties suitable for	Karjat-3, Karjat-4, Karjat-7 and	Hamanai and Chastal
organic farming	Palghar-1	Hemangi and Sheetal

Crop (*Kharif*): **Rice** Important features of suitable varieties

Parameters Karjat-3	Karjat-4	Karjat-7	Palghar-1
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Duration (days)	115-120	110-115	115-120	125-130
Average yield under organic condition (kg/ha)	3500 to 3700	3300 to 3500	3400 to 3600	3900 to 4100
Source (s) of availability	RARS, Karjat	RARS, Karjat	RARS, Karjat	RARS, Karjat
Suitable regions/districts in the state	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in Maharashtra.	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in <i>Konkan</i> region of Maharashtra.	Suitable for rainfed uplands and irrigated transplanted conditions in Maharashtra State.	Konkan region and Maharashtra state
Specific resistance/tolerance to pest	Tolerant to stem borer	Moderately resistant to leaf folder	Resistant to leaf folder, BPH,WBPH and moderately resistant to stem borer	Moderately resistant to stem borer
Specific resistance/tolerance to disease	Resistant to blast and moderately resistant to BLB and brown spots.		Moderately resistant to blast and BLB	Moderately resistant to blast
Specific tolerance to drought/water logging	Suitable for high rainfall zone	Suitable for high rainfall zone	Suitable for high rainfall zone	Suitable for high rainfall zone

Nursery raising practices

Area of nursery required for 1 ha	0.10 ha (0.10 ha (1000m ²)			
Nursery raising method	Wet nu	rsery /Mat nurser	y/Raised bed method etc.		
Bed size (length x breadth in m)			nd (sloppy land less length,		
	plane lan	d more length) - Br	eadth- 1 m		
Seed sowing rate/m ²	45 to 50	g/m ²			
Pre-sowing seed/soil treatment	Materi	Quantity/kg of	Method of application		
	als	seed or per m ²			
		area			
	Trichod erma	5g/kg of seed	Seed treatment		
Source and optimum quantity of	Materi	Quantity/m ²	Method of application		
organic manures/other nutrient	als	area			
source/m ² of nursery	EVM	3 kg/m ² area	Soil incorporation before		
	FYM	3 kg/m area	nursery sowing		
Irrigation practices		Raiı	nfed		

Weed management	Mulching	Mulching of Glyricidia green leaves and mannual hand			
	weeding	weeding			
Organic plant protection practices	Name	Recommended			
	of	organic	Quantity/m ² area		
	pest/di	est/di material used Quantity/n			
	sease	for control			
	Differe	Application of	1500 ppm@5 ml/lit of		
	nt	neem	water for two times		
	insect	formulation			
	pests				
Optimum age of nursery (days)	22 to 26	days			

Field preparation:

Field is ploughed for solar heating in the month of May. Second ploughing and clod crushing is done before monsoon with wooden plough or tractor or power tiller drawn cultivator. Puddling is done by wooden plough or tractor or power tiller drawn puddler. Bullock drawn *Pankaj* puddler developed by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli should be used for better puddling. The field should be mannured with FYM and Neem cake @ 5 and 0.5 tonnes/ha, respectively before puddling. Similarly, 4.5 tonnes/ ha of *Glyricidia* green leaf and 4.2 tonnes/ha of rice straw be incorporated into puddled field prior to transplanting.

Pre-sowing/planting treatment of seed/seedlings	Material rate (k		mended g/ha or 'ha)	Method of application	
	Phosphate solubilizing bacteria (PSB)	PSB 2.5 k Azospirilli + 100 lit c	_	Seedling root dip for 20 to 30 minutes in the	
	and <i>Azospirillum</i>	100 110	water/na	slurry	
Spacing (Row x Plant) in cm		20x1	5cm		
Number of seedlings/hill		3-4 seed	lings/hill		
Basal application of	Source Quantity/h			Quantity/ha	
organic manures including soil application	FYM		6670 kg /ł	na before puddling	
of bio-fertilizers, bio-	Glyricidia Green leav	'es	1220 kg /ha before puddling		
control agents etc.	Rice straw		5470 kg /ha soil incorporation before transplanting		
Irrigation practices	Rainfed during Khari	f and canal	irrigation d	uring <i>Rabi</i>	
Major weeds	Echinochloa crusgall	i (Phakhad)	, Echinoch	loa colonum	
	(Phakhad), Cyperus i	<i>iria</i> (Lavala	.), Cyperus i	rotundus (Lavala)	
	and Ischane globossa	, ,	T		
Weed management	Critical stage of weeding			ended practice for	
			organic co		
	20 Days after transpla			eder hoeing	
	30 Days after transpl	anting	Cono- weeder hoeing and		
	(Tillering)		manual ha	and weeding	

60 Days after transplanting (Panicle initiation)	Manual hand weeding
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Organic plant protection practices	Name of the pest/disease	Organic material recommended for control
Insect pests	Stem borer	 Ploughing and collection of stubbles and their composting after harvesting of rice. Use of tolerant and resistant varieties. Crop rotation with ground nut, <i>Dolichos</i> bean, cucumber and red pumpkin. Harvesting of rice close to the ground with <i>Vibhav</i> sickle developed by DBSKKV; Dapoli to kill the hibernating larvae. Use of pheromone traps @20 Nos./ha Release of <i>Trichogramma</i> @ 50000/ha for 4 times. Collection of egg masses and their destruction. Conservation and preservation of frogs in the field
	Case worm	 Timely transplanting Intermittent draining out water from the field Flooding the field followed by dragging a rope across the field and draining out the water from the field
	Brown Plant Hoppers (BPH), White Backed Plant Hoppers (WBPH) and Blue beetle	 Use of tolerant and resistant varieties. Intermittent draining out water from the field Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm) Formation of alley ways for every three meters for penetration of sunlight and proper aeration
	Army worm	 Deep ploughing after harvesting of crop to expose the hibernating stages of pest. Everyday inspection of the field during dry spell and at maturity. Keeping the bunds clean and free of weed in the beginning of the season. Digging the trench and flooding it with water for preventing migration of larvae from one field to another field.

	Leaf eating caterpillars	 Erection of bird perches. Harvesting the crop immediately after it attains the maturity. Conservation and preservation of frogs in the field. Erection of bird perches.
	caterpinars	Use of tolerant and resistant varieties.
Diseases	Blast and sheath rot	 Ose of tolerant and resistant varieties. Spraying of <i>Pseudomonas fluroscence</i> @ 8-10 g / lit of water [for 2-3 times] starting from maximum tillering to flowering stage.
	Bacterial leaf blight	 Use of tolerant and resistant varieties. Intermittent draining out water from the field. Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm)

Yield and economics: q/ha

Parameters	2007-08	2008-09	2009-10	2010-11	2011- 12	2012-13	
Economic	2650	0.45	4175	2720	25.65	Grain	Straw
yield (kg/ha)	2650	945	4175	3728	3565	3414	4097
Price (Rs/kg 25% Premit prevailing m	ım on	Grain: Rs.15.63/kg Straw: Rs. 2 / kg					
Cost of culti (Rs/ha)	vation	42016					
Net Returns	(Rs/ha)	19539					

^{*}based on prices of 2013-14

Crop (Rabi): Cucumber

Important features of suitable varieties: Hemangi and Sheetal

	Varie	ety
Parameters	Hemangi	Sheetal
Duration (days)	100-110	95-105
Average yield under organic condition (kg/ha)	11500-12000	12000-12500
Source (s) of availability	Government/private agencies	DBSKKV, Dapoli
Suitable regions/districts in the state	Maharashtra state	Maharashtra state
Specific resistance/tolerance to disease	Tolerant to powdery mildew and downy mildew	

Field preparation:

Ploughing the field after harvest of *Kharif* rice. Criss-cross cultivation and clod crushing with peg tooth cultivator to bring the soil into good tilth.

Seed rate (kg/ha)	2.75 kg/ha				
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit./ha)		Method of application	
	Trichoderma	5g/kg of se	ed	Seed treatment	
	PSB	25g/kg of so	eed	Seed treatment	
Spacing (Row x Plant) in cm		1.5 x 0	.9 m		
Basal application of organic	Sour	rce	(Quantity/ha	
manures including soil application	FYN	M		9000 kg/ha	
of bio-fertilizers, bio-control agents	Neem	Neem cake		870 kg/ha	
etc.	Vermico	mpost	3000 kg/ha		
Irrigation practices	Number of	Most crit	tical	Depth of	
	irrigation	stage of irri	gation	irrigation (cm)	
	12 irrigations	12 irrigation		72 cm	
		interval o	f 7-8	(6 cm/irrigation)	
		days			
Major weeds	Physalis minim				
	(Motha ghol), A				
	Blumea lacera (Bhamrud) and Amaranthus viridis				
	(Ranti math)				
Weed management	Critical stage of weeding Recommended practic				
	for organic condition				
	30-60 DAS		Hand we	eeding	

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control	Quantity (kg or liters/ha)
Insect pests	Red pumpkin beetle	Application of neemicide.	3ml/lit
	Fruit fly	Erection of Rakshak pheromone trap designed by Dr. BSKKV, Dapoli	4 Nos. /ha
Diseases	Powdery and Downey mildew	 Growing tolerant a varieties. Crop rotation.	nd resistant
Optimum stage of harvesting (in case of vegetables and green cob)	• 60-100 DA	AS.	

Yield and economics: q/ha

Parameters	2007- 08	2008-09	2009-10	2010-11	2011-12	2012-13
Economic yield (kg/ha)	6044	8507	5509	5919	11357	12537
Price (Rs/kg) consider 25% Premium on prevailing market price	Rs.15/kg					
Cost of cultivation (Rs/ha)	86505					
Net Returns (Rs/ha)	101550					

^{*}based on prices of 2013-14

Rice-Cucumber cropping system economics:

Gross Returns (Rs/ha)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio	
249610	128521	121089	1.94	

Cropping Systems 4: Rice-Red pumpkin

Particulars	Kharif	Rabi
Crop	Rice	Red pumpkin
Fortnight of	Nursery Sowing -Second	Sowing – First fortnight of
sowing/planting	fortnight of June	January
	Transplanting- Second	
	fortnight of July	
Fortnight of harvesting	Second fortnight of October	First fortnight of April
Varieties suitable for	Karjat-3, Karjat-4, Karjat-7 and	MPH-1
organic farming	Palghar-1	

Crop (Kharif): Rice

Important features of suitable varieties

Parameters	Karjat-3	Karjat-4	Karjat-7	Palghar-1
Duration (days)	115-120	110-115	115-120	125-130
Average yield	3500 to 3700	3300 to 3500	3400 to 3600	3900 to 4100
under organic				
condition (kg/ha)				
Source (s) of	RARS, Karjat	RARS, Karjat	RARS, Karjat	RARS, Karjat
availability			_	
Suitable	Suitable for rainfed	Suitable for	Suitable for	Konkan region

regions/districts in the state	uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in Maharashtra.	rainfed uplands as well as irrigated areas for Kharif and Rabi seasons in Konkan region of Maharashtra.	rainfed uplands and irrigated transplanted conditions in Maharashtra State.	and Maharashtra state
Specific	Tolerant to stem	Moderately	Resistant to leaf	Moderately
resistance/tolerance	borer	resistant to	folder,	resistant to
to pest		leaf folder	BPH,WBPH	stem borer
			and moderately	
			resistant to stem	
			borer	
Specific	Resistant to blast		Moderately	Moderately
resistance/tolerance	and moderately		resistant to blast	resistant to
to disease	resistant to BLB		and BLB	blast
	and brown spots.			
Specific tolerance	Suitable for high	Suitable for	Suitable for	Suitable for
to drought/water	rainfall zone	high rainfall	high rainfall	high rainfall
logging		zone	zone	zone

Nursery raising practices

practices	Name of pest/disease	Olignfity/m ⁻ area				
Organic plant protection	weeding	Recommended				
Weed management	_	<i>lyricidia</i> green leav	res and mannual hand			
Irrigation practices		Rainfe	ed			
manures/other nutrient source/m ² of nursery	FYM	3 kg/m ² area	Soil incorporation before nursery sowing			
Source and optimum quantity of organic	Materials	Quantity/m ² area	Method of application			
	Trichoderma	5g/kg of seed	Seed treatment			
Pre-sowing seed/soil treatment	Materials Quantity/kg of seed or per m ² Method of application area					
Seed sowing rate/m ²	$45 \text{ to } 50 \text{ g/m}^2$					
Bed size (length x breadth in m)		th) - Breadth- 1 m	oppy land less length, plane			
Nursery raising method			Raised bed method etc.			
1 ha						
Area of nursery required for	0.10 ha (1000n	n^2)				

	Different insect pests	Application of neem formulation	1500 ppm@5 ml/lit of water for two times
Optimum age of nursery (days)	22 to 26 days		

Field preparation:

Field is ploughed for solar heating in the month of May. Second ploughing and clod crushing is done before monsoon with wooden plough or tractor or power tiller drawn cultivator. Puddling is done by wooden plough or tractor or power tiller drawn puddler. Bullock drawn *Pankaj* puddler developed by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli should be used for better puddling.

The field should be mannured with FYM and Neem cake @ 5 and 0.5 tonnes/ha, respectively before puddling. Similarly, 4.5 tonnes/ ha of *Glyricidia* green leaf and 4.2 tonnes/ha of rice straw be incorporated into puddled field prior to transplanting.

Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit./ha)		Method of application
	Phosphate solubilizing bacteria	PSB 2.5 k Azospirilli	_	Seedling root dip for 20 to 30
	(PSB) and Azospirillum		of water/ha	minutes in the slurry
Spacing (Row x Plant) in cm	and Lospit titim	20x1	5cm	Starry
Number of seedlings/hill		3-4 seed	lings/hill	
Basal application of	Source		Quantity/ha	
organic manures including soil application	FYM		6670 kg /ha before puddling	
of bio-fertilizers, bio-	Glyricidia Green leaves		1220 kg /ha before puddling	
control agents etc.	Rice straw		5470 kg /ha soil incorporation before transplanting	
Irrigation practices	Rainfed during Khari	f and canal	irrigation d	uring <i>Rabi</i>
Major weeds	Echinochloa crusgall	i (Phakhad)	, Echinoch	loa colonum
	(Phakhad), Cyperus and Ischane globossa), Cyperus	rotundus (Lavala)
Weed management	Critical stage of wee	ding	Recomme organic co	ended practice for ondition
	20 Days after transpla	anting	Cono- wee	eder hoeing
	30 Days after transpl	anting		eder hoeing and
	(Tillering)			and weeding
	60 Days after transplanting (Panicle initiation)		Manual hand weeding	

Organic plant	Name of the	Organic material
protection	pest/disease	recommended for control

practices		
Insect pests	Stem borer Case worm	 Ploughing and collection of stubbles and their composting after harvesting of rice. Use of tolerant and resistant varieties. Crop rotation with ground nut, <i>Dolichos</i> bean, cucumber and red pumpkin. Harvesting of rice close to the ground with <i>Vibhav</i> sickle developed by DBSKKV; Dapoli to kill the hibernating larvae. Use of pheromone traps @20 Nos./ha Release of <i>Trichogramma</i> @ 50000/ha for 4 times. Collection of egg masses and their destruction. Conservation and preservation of frogs in the field Timely transplanting
		 Intermittent draining out water from the field Flooding the field followed by dragging a rope across the field and draining out the water from the field
	Brown Plant Hoppers (BPH), White Backed Plant Hoppers (WBPH) and Blue beetle	 Use of tolerant and resistant varieties. Intermittent draining out water from the field Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm) Formation of alley ways for every three meters for penetration of sunlight and proper aeration
	Army worm	 Deep ploughing after harvesting of crop to expose the hibernating stages of pest. Everyday inspection of the field during dry spell and at maturity. Keeping the bunds clean and free of weed in the beginning of the season. Digging the trench and flooding it with water for preventing migration of larvae from one field to another field. Erection of bird perches. Harvesting the crop immediately after it attains the maturity. Conservation and preservation of frogs in the field.
	Leaf eating caterpillars	• Erection of bird perches.
Diseases	Blast and sheath rot	 Use of tolerant and resistant varieties. Spraying of <i>Pseudomonas fluroscence</i> @ 8-10 g / lit of water [for 2-3 times] starting from maximum tillering to flowering stage.
	Bacterial leaf blight	 Use of tolerant and resistant varieties. Intermittent draining out water from the field. Judicious use of nitrogenous fertilizers.

	 Adoption of proper spacing (20x15cm)
--	--

Yield and economics: q/ha

Parameters	2007-08	2008-09 2009-10 2010-11 2011-12 2		20	2012-13		
Economic	3050	1260	4253	3676	3445	Grain	Straw
yield (kg/ha)	3030	1200	4233	3070	3443	3236	3850
Price (Rs/kg) consider 25% Premium on prevailing market price			(Grain : Rs.1. Straw : Rs.	C		
Cost of cultiva (Rs/ha)	tion	42016					
Net Returns (F	Rs/ha)	16263					

^{*}based on prices of 2013-14

Crop (Rabi): Red pumpkin

Important features of suitable varieties: MPH-1

Parameters	Variety :MPH-1
Duration (days)	95-100
Average yield under organic condition (kg/ha)	12500-13000 kg/ha
Source (s) of availability	RARS,Karjat
Suitable regions/districts in the state	Maharashtra state
Specific resistance/tolerance to disease	Tolerant to powdery mildew and downy mildew

Field preparation:

Ploughing the field after harvest of *Kharif* rice. Criss-cross cultivation and clod crushing with peg tooth cultivator to bring the soil into good tilth.

Cultural practices						
Seed rate (kg/ha)	6.5 kg/ha					
Pre-sowing/planting treatment of seed/seedlings	Material Recomment rate (kg/ha lit./ha)		a or	Method of application		
	Trichoderma	5g/kg of see	ed	Seed treatment		
	PSB	25g/kg of se	ed	Seed treatment		
Spacing (Row x Plant) in cm	1.5 x 0.9 m					
Basal application of organic	Source Q			Quantity/ha		
manures including soil application	FYM			6670 kg/ha		
of bio-fertilizers, bio-control agents	Neem	cake		650 kg/ha		
etc.	Vermico	mpost		2230 kg/ha		
Irrigation practices	Number of	Most criti	ical	Depth of		
	irrigation	stage of irrigation		irrigation (cm)		
	10 irrigations	10 irrigations at an		60 cm		
		interval of 10) days	(6 cm/irrigation)		
Major weeds	Physalis minime	Physalis minima (Ranpopati), Portulaca oleracea				

	` ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	(Motha ghol), Alternanthera sessilis (Reshimkata), Blumea lacera (Bhamrud) and Amaranthus viridis (Ranti math)		
Weed management	Critical stage of weeding	Recommended practice		
		for organic condition		
	30-60 DAS	Hand weeding		

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control	Quantity (kg or liters/ha)
Insect pests	Red pumpkin beetle	• Spraying of neemicide	3ml/lit
	Fruit fly	• Erection of Rakshak pheromone trap designed by DR. B.S.K.K.V. Dapoli.	4 Nos. / ha
Diseases	Powdery mildew and downy mildew	Follow crop rotationMaintain field sani	
Optimum stage of harvesting	• 90 – 100 I	DAS	

Parameters	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Economic yield (kg/ha)	17421	3369	11024	8450	12561	12726
Price (Rs/kg) consider 25% Premium on prevailing market price	Rs. 12.50kg/ha					
Cost of cultivation (Rs/ha)	85170					
Net Returns (Rs/ha)	73905					

Rice-Red pumpkin cropping system economics:

Gross Returns (Rs/ha)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
217354	127186	90168	1.71

^{*}based on prices of 2013-14

Meghalaya

Package of Practices for Organic Crop Production

Prepared by Anup Das, Ramkrushna G.I., Jayanta layek, Bidyapati Ngangom and Dauni Suting, ICAR Research complex for North East Hill Region

Suggested cropping systems (based on testing under NPOF)

- 1. Rice-Carrot (Raised beds in lowland)
- 2. Rice-Tomato (Raised beds in lowland)
- 3. Maize + soybean- French bean (Upland)

Cropping System 1: Rice-Carrot

Particulars	Kharif	Summer
Crop Rice		Carrot
Fortnight of sowing/planting	I IIIV (tranchianting)	
Fortnight of harvesting	November	Last week of April
Varieties suitable for organic farming	Shahsarang 1, Lampnah	New Kuroda

Crop (kharif): Rice

Important features of suitable varieties

Parameters	Variety			
	Shahsarang 1	Lampnah		
Duration (days)	140-145	140-150		
Average yield under organic condition (kg/ha)	3600	3400		
Source (s) of availability	ICAR-RC NEH, Umiam	ICAR-RC NEH, Umiam		
Suitable regions/districts in the state	Ri-Bhoi district (800-1200 m above mean sea level)	Ri-Bhoi district (800-1200 m above mean sea level)		
Specific resistance / tolerance to pest	Tolerant to stem borer	Tolerant to stem borer		
Specific resistance / tolerance to disease	Tolerant to blast	Tolerant to blast		
Specific tolerance to drought/waterlogging	Tolerant to Iron toxicity and blast	Tolerant to blast		

Nursery raising practices of rice:

Area of nursery required for 1 ha	400 m^2
Nursery raising method	Raised bed method

Bed size (length X breadth in m)	10 m Length x 1.2	5 m breadth x 15 cm	Height	
Seed sowing rate/m ²	50 g per m ²			
Pre-sowing seed/soil treatment	Materials	Quantity/kg of seed or per m ²	Method of application	
	Trichoderma	area 20 ml in 500 ml	Cood treatment	
	harzianum	of water per acre	Seed treatment	
	Neem cake	40 g per m^2	Soil application	
Source and optimum quantity of	Materials Quantity/m ² area Method of			
organic manures/other nutrient			application	
source/m ² of nursery	Farmyard	1.5 kg/m^2	Soil mixing @	
	manure (FYM)		2:1 ratio	
Irrigation practices	If continuous of	dry spell occurs for 4	-5 days, then	
	irrigation	n is advocated with re	ose can	
Weed management	Two hand weed	ding at 8 and 15 Days	s after sowing	
		(DAS)		
Organic plant protection practices	Name of pest/	Recommended	Quantity/m ²	
	disease	organic material	area	
		used for control		
	Leaf Hopper	Neem oil	3 ml/lt	
Optimum age of nursery (days)	20 days			

Field preparation: The land is prepared thoroughly and well levelled with peripheral bunding. Puddling is done 2-3 times to make it weed free and water retentive. All weed biomass and crop residues of previous crop are incorporated with the soil during ploughing.

A nutrient dose of 80:60:40 kg/ha of N, $P_2O_5\&$ K_2O is recommended. To supply these amount, about 15 t/ha of FYM is applied at around 15-20 days before transplanting. Also to obtained the required P nutrient dose, about 150 kg/ha of rock phosphate is applied in addition to the soil during transplanting. These nutrients are applied on N and P equivalent basis.

Cultural practices of rice

Seed rate (kg/ha) (Not applicable for nursery crops)	25-30 kg/ha			
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application	
	Azospirillium	100 ml in 10 Litres of water	Root dip treatment (seedling roots are immersed in Azospirillium slurry for about 30 minutes before planting).	
Spacing (row X plant) in cm		20 cm x 15 cm		
Number of seedlings/hill (in nursery crops only)		2 seedlings		

Basal application of organic	Sc	ource		Oı	uantity/ha
manures including soil		YM		15 t/ha	
application of bio-fertilizers,	Neem cake			100 kg/ha	
bio-control agents etc		hosphate	;		50 kg/ha
		<u>F</u>			
Top dressing of organic				D	ays after
manures	Source	Qua	ntity		g/planting or
		•	•		ge of crop
	Vermiwash	100 ml	per litre	40-45 D	OAT (Days after
	Verilliwasii	of v	vater	trai	nsplanting)
	Panchagavya	3 litres	per 100	Flox	wering stage
	1 alichagavya	litres o	of water	1100	wering stage
Irrigation practices	Number of	Most	critical	Donth	of irrigation
	irrigations	0	es for	Depth	(cm)
			gation		` ,
					d by managing
			_		n is maintained
		_	•		water is drained
					tillering. Water
					maturity. If dry
				J-12 da <u>y</u>	ys, life saving
Maiorywada	irrigation is reco		a.	Comm	
Major weeds	Scientific nan				on name
	Spilanthus Acmella Alternanthera philoxeroides		dag	Toothache plant Alligator weed	
	Rotala indica	nuoxeroi	aes	Indian toothcup	
				rd grass	
	Echinicloa crusgalli Cyperus rotundus			Nutgra	
	Ageratum houst			Floss fl	
	Polygonum hyd				
				Water 1 False h	
Wood management	Cuphea hyssopi		D	1	
Weed management	Critical stag			commended practice for organic condition	
	30-45 DA	•			
	30-43 DA	11		o hand weeding and or no-weeding is recommende	
				_	ds. First hand
				ng is done at 20 DAT and	
			second at 55 DAT. One co		
				e use of cono	
	l		weeder is carried out at 35 DAT		
Organic plant protection	Name of pest/	disease	Orga	nic	Quantity (kg
practices	_		mate		or litres/ ha)
			recomm		
			for co	ntrol	
	Common insec	-	Peston		3 ml/lt
	and diseases	of rice	Deris		2 ml/lt
			Neem		100 kg/ha
			(So	il	

		application)	
Optimum stage of harvesting	The crops should be har	vested at appropri	iate time. Over
	maturing reduces market d	demand	

Yield and Economics of rice

Parameters	1 st *year	2 nd	$3^{\rm rd}$	4 th	5 th	6 th	7^{th}
Economic yield (kg/ha)	3900	3660	3198	3165	3800	3760	4470
Price of rough rice (Rs/kg)	Rs. 20/kg						
Cost of cultivation* (Rs/ha)	Rs. 53460						
Net returns* (Rs/ha)	Rs. 35940						

^{*}based on prices of 2013-14

Crop (summer): Carrot

Important features of suitable variety of carrot (New Kuroda)

Parameters	New kuroda
Duration (days)	95-100
Average yield under organic condition (kg/ha)	13600
Source (s) of availability	ICAR-RC Umiam
Suitable regions/districts in the state	Ri-Bhoi, Mid altitude of Meghalaya (800-1200 m ASL)
Specific resistance / tolerance to pest	No major insect-pest found
Specific resistance / tolerance to disease	No major diseases found
Specific tolerance to drought/waterlogging	Susceptible to water logging condition

Field preparation: After the harvest of rice, the land is configured into temporary raised bed of 30 cm height, 3m width and 7 m length to facilitate drainage for the growing of carrot crop. The soil is prepared by one deep ploughing with spade followed by harrowing. At least $1/3^{\text{rd}}$ rice residues is retained and incorporated into the soil during ploughing. Planking is done to make the soil clod free. As the seeds of carrot are very small, the field is to be prepared up to a fine tilth. After the sowing of seeds in line, a mixture of soil and FYM (2:1) is spread over the seeds for covering.

Cultural practices of carrot

Seed rate (kg/ha) (Not	5-6 kg/ha	
applicable for nursery crops)		
Spacing (Row X plant) in cm	30 cm x 3-4 cm	
Basal application of organic	Source	Quantity/ha
manures including soil application of bio-fertilizers, bio-control agents etc	1 2	1.5 kg/ha

Top dressing of organic manures	Source	Quantity/ha	sowing/planting or stage of crop	
	Vermiwash	50 l/ha	Vegetative and	
			flowering stage	
Irrigation practices	Number of	Most critica	_	
	irrigations	stages for	irrigation (cm)	
	T M 1 1 C	irrigation	C : 1 : 1	
		_	f rice, there is enough	
			epage from surrounding	
	_	•	er residual soil moisture.	
		ed, life saving if	rrigation is given during	
Major woods	dry spell. Scientific name	Ca	ommon name	
Major weeds				
	Commelina bengha		y flower	
	Galinsoga parviflor		Gallant soldier	
	Oxalis corniculata		eeping beauty	
	Chenopodium albur	n La	mb's quarters	
	Drymaria cordata	Tre	opical chick weed	
Weed management	Critical stage of	Recommende	ed practice for organic	
	weeding	(condition	
	30-35 DAS		eding and hoeing along	
			p at about 30-35 DAS is	
			suppress weed growth.	
		_	o being done at the time	
		of weeding.		
Organic plant protection	Name of	Organic	Quantity (kg or	
practices	pest/disease	material	litres/ ha)	
		recommende	u	
	Cornet fly	for control	21/14	
	Carrot fly, Bacterial blight,	Pestoneem	3 ml/lt	
	Powdery mildew		2.17	
	1 Owdery mindew	Derisom	2ml/lt	
Optimum stage of harvesting	The root attain marketable stage when their diameter of			
	tuber is 2-4 cm at th	e upper end		

Yield and Economics of carrot

Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic yield (kg/ha)	7780	14060	11950	11860	11970	14100	12750
Price (Rs/kg) (consider 25 %							
premium on prevailing	Rs. 20/kg						
market price)							

Cost of cultivation* (Rs/ha)	Rs. 70765
Net returns* (Rs/ha)	Rs. 184235

^{*}based on prices of 2013-14

Glimpses



Fig: Collection of FYM from pit



Fig: Application of rock phosphate before sowing of rice



Fig: Vermiwash drum

Few suitable organic pesticides used in all three cropping system



Fig: Vermiwash









Fig: Pestoneem

Cropping System 2: Rice-Tomato

Particulars	Kharif	Summer
Crop	Rice	Tomato
Fortnight of sowing/planting	July (planting)	February
Fortnight of harvesting	November	May
Varieties suitable for organic farming	Shahsarang 1, Lampnah	Rocky, Avinash-2

Crop (kharif): Rice

Crop (Summer): Tomato

Important features of suitable varieties

Parameters	Rocky	Avinash 2
Duration (days)	100-105	105-110
Average yield under organic	20425	21309
condition (kg/ha)		
Source (s) of availability	ICAR-RC Umiam	ICAR-RC Umiam
Suitable regions/districts in the state	Ri-Bhoi	Ri-Bhoi
Specific resistance /tolerance to pest	-	
Specific resistance /tolerance to	Tolerant to Fusarium	
disease	wilt, Grey leaf spot and	
	Verticillium wilt	

Nursery raising practices:

Area of nursery required for 1 ha	200 m^2				
Nursery raising method	Raised bed meth	Raised bed method			
Bed size (length X breadth in m)	10 m Length x 1	m breadth x 1	5 cm Height		
			stance along the width of		
	bed with the he	elp of bamboo	o stick. Vermicompost is		
	applied on prep	ared beds and	d seeds are sown in line		
	followed by c	overing with	vermicompost or sand.		
	Nursery bed is c	covered with di	ry grass or paddy straw or		
	1 2	•	luce early germination of		
	seeds. The cove	ring is remove	ed immediately as soon as		
	sprouts come out.				
Seed sowing rate/m ²	5 g/m^2				
Source and optimum quantity of	Materials	Quantity/	Method of application		
organic manures/other nutrient		m ² area			
source/m ² of nursery	Vermicompost	4 kg/m^2	Mixing with soil		
Irrigation practices	After sowing of seeds, the nursery beds are irrigated				
	with water and thereafter, light irrigation with rose can				
	is given everyda	y morning and	evening.		

Weed management	Two hand weeding is needed to suppress weed growth				
Organic plant protection practices	Name of pest/disease	Recommended organic material used for control	Quantity/ m ² area		
	No pesticides applie	ed in nursery			
Optimum age of nursery (days)	25-30 days				

Field preparation: The land is configured into temporary raised bed of 30 cm height, 2m width and 8 m length after the harvest of rice, to facilitate the growing of Tomato crop. A well pulverized soil is obtained by ploughing the raised beds 2 times followed by harrowing. 30 % of rice stubbles is retained and incorporated into the soil during ploughing.

Since the soil of this region is acidic in nature, lime application is recommended @ 500 kg/ha during the final bed preparation. FYM @ 20 t/ha (on N equivalent basis) is applied in pits of 50cm x 50cm spacing at the time of transplanting. To supplement the requirement of Phosphorus, Rock phosphate @ 200 kg/ha (on P equivalent basis) is applied in the pits during transplanting time. Neem cake @ 150 kg/ha is also applied in the pits before transplanting to check soil borne diseases

Cultural practices of tomato

Seed rate (kg/ha)	400 g/ha					
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)		Method of application		
	Trichoderma harzianum	100 ml in 10 Litres of water				Root dip treatment (seedling roots are immersed in <i>Trichoderma</i> slurry for about 30 minutes before planting).
Spacing (Row X plant) in cm	50 cm x 50 cm					
Number of seedlings/hill (in nursery crops only)	1 seedling per hill					
Basal application of organic	Source			Quantity/ha		
manures including soil	FYM			20 t/ha		
application of bio-fertilizers, bio-	Rock phosp	hate		200 kg/ha		
control agents etc	Neem cal	ĸe		150 kg/ha		
Top dressing of organic manures	Source	Quantity/ha		Days after sowing/planting or stage of crop		
	Panchagavya	3 litres per 100 litres of water		25-30 DAT		

Irrigation practices	Number of irrigations	Most criti			
	8	irrigatio			
	During dry	Vegetativ	ve,		
	year, 2-3 life	Flowering and			
	irrigation is	Fruit forma	ition		
	required.	stage.			
Major weeds	Scientific name		Com	mon name	
	Drymaria cordata	a	Tropi	cal chick weed	
	Galinsoga parviflo	ra	Gallar	ant soldier	
	Oxalis corniculata Sleep			ping beauty	
	Commelina bengha	ılensis	Day f	lower	
Weed management	Critical stage of	Recomm		practice for organic	
	weeding			ondition	
	Vegetative stage			d hoeing	
Organic plant protection practices	Name of pest/ disease	Organic m		Quantity (kg or litres/ ha)	
	uisease	contro		nti es/ na)	
	Leaf miner, Fruit	Lantana		100 ml in 1 litre of	
	borer, White fly	extract (10%)		water	
		Pestone	em	2.5 ml/lt	
	Nematodes and Late blight	Deriso	m	2 ml/lt	
Optimum stage of harvesting	Pink to light red co	lour fruits		ı	

Yield and Economics of tomato

Parameters	1 st *year	2 nd	$3^{\rm rd}$	4 th	5 th	6 th	7^{th}
Economic yield (kg/ha)	29800	25000	24500	26200	19300	21300	20600
Price (Rs/kg) (consider 25 % premium on prevailing market price)	_						
Cost of cultivation*(Rs/ha)	Rs. 11204	10					
Net returns* (Rs/ha)	Rs. 19695	50	•				·

^{*}based on prices of 2013-14

Glimpses



Fig: Mixing of FYM and soil for nursery bed preparation (2:1)

Fig: Preparing tomato pits for transplanting

Fig: Applying rock phosphate in tomato pit







Fig: Tomato grown under organic in raised beds

Fig: Fruiting of tomato

Fig: Harvested tomato from organic plot

Cropping System 3: Maize+soyabean-Frenchbean

Particulars	Kharif	Summer
Crop	French bean	Maize+soyabean
Fortnight of sowing /planting	August	April-May
Fortnight of harvesting	November	July-August
Varieties suitable for organic farming	Naga local, RCM-FB-18	Maize-DA-61-A, RCM-1-3 Soyabean- JS-80-21

Crop (kharif): Maize+soybean (2:2 ratio)

Important features of suitable varieties

Parameters	Maize V	arieties	Soyabean
	DA-61-A	RCM-1-1	JS-80-21
Duration (days)	110-115	110-120	145-150
Average yield under organic condition (kg/ha)	4200-4500 4000-4300		4800-5100
Source (s) of availability	ICAR-RC NEH,	ICAR-RC NEH,	ICAR-RC NEH,
	Umiam	Umiam	Umiam
Suitable regions/districts in	Ri-Bhoi district,	Ri-Bhoi district,	Ri-Bhoi district,
the state	Dimapur	Dimapur	Dimapur
	(Nagaland), Garo	(Nagaland), Garo	(Nagaland), Garo
	Hills district	Hills district	Hills district
Specific resistance/tolerance	Tolerant to Stem		
to pest	borer		

Field preparation: Land is ploughed 2 times at a depth of 20-25 cm followed by 2 harrowing to obtain fine tilth. A properly levelled and uniformly graded field is required for good water management. Good drainage should be provided in maize field, because stagnation of water in the field is harmful to the crop. Lime @ 500kg/ha is mixed with the soil at final land preparation to improve soil health. It is to be noted that liming is carried out only once in 3 years.

Maize is intercropped with soyabean at 2:2 ratio (soyabean-maize-maize-soyabean-soyabean-maize i.e. 30-50-50-30-50 cm). To obtain the mentioned ratio, two lines of maize are grown at a distance of 50 cm apart alternated by two lines of soyabean at a distance of 30 cm apart. The Farmyard manure (FYM) @ 15 t/ha (on N equivalent basis), Rock phosphate @ of 150 kg/ha (on P_2O_5 equivalent basis) and neem cake @ 100 kg/ha are applied in the opened furrows and mixed well with the soil at the time of sowing. Seeds are placed in these furrow lines, at a distance of 25 cm for maize and 10 cm for soyabean and covered with soil.

When the soyabean crop reaches 40-45 days, leaving about 30 cm standing stalks upper portion of the soyabean plant is detopped and placed besides the maize plant for better plant nutrition. The soyabean biomass is then used for green manuring. Earthing up of maize is done after the detopping of soyabean for proper crop stand of maize and also for better incorporation of soyabean biomass into the soil.

Cultural practices of Maize

Seed rate (kg/ha) (Not applicable for nursery crops)						
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application			
	Trichoderma viride	5 g/kg of seed	Seed treatment			
Spacing (row X plant) in cm		50 cm x 25 cm				
Basal application of organic	Source	Qua	antity/ha			
manures including soil	FYM	1	5 t/ha			
application of bio-fertilizers,	Neem cake	15	0 kg/ha			
bio-control agents etc	Rock phospha	ite 20	0 kg/ha			

Top dressing of organic	c Source Quantity		Days after			
manures					ng/planting or	
	***	100	1 11 6	Sl	tage of crop	
	Vermiwash	100 n	nl per litre of		30 DAS	
	D 1	2.11	water	- TC	1: (60.65	
	Panchagavya		cres per 100	Tas	sseling (60-65	
Tuningtion magations	N		es of water DAS)			
Irrigation practices	Number	OI IFFI	gauons	Most critical		
				stages for		
	Maiza is gre	grown under rainfed			irrigation high stage	
	_			Knee	Tasseling stage	
		Meghalaya. However, y spell for 15-20 days		and	rassening stage	
		saving irrigation may be				
		ical stages of the crop.				
Major weeds	Scientific nar		1	Com	mon name	
	Alternanthera philoxeroides				gator weed	
	Drymaria cord	ordata			Tropical chick	
				weed		
	Commelina ber	enghalensis		Day flower		
	Ageratum cony	zoides		Goat weed		
Weed management	Critical stag	ge of		ended practice for		
	weeding			anic condition		
	Knee high stag				weeding is	
	Tasseling stage	•			nanage weeds.	
				eeding is done at 25		
	> 7			ond at 50 DAS.		
Organic plant protection	Name of		Organic		Quantity (kg	
practices	pest/diseas	se	material recommend		or litres/ ha)	
			for contro			
	Stem bore	ar	Pestoneem		3 ml/lt	
	Cob bore	-	Derisom	1	2.5 ml/lt	
	Cut worm		Lantana lea	af	10 %	
	Leaf bligh		extract	**	10 /0	
	Brown spo		- Sittact			
Optimum stage of harvesting	The cob is harvested when the plant has become straw coloured (light brown) and the grain hard, some of the cobs will droop downwards.					

Yield and Economics of maize

Parameters	1 st *ye	2 nd	3 rd	4 th	5 th	6 th	7^{th}
	ar						
Economic yield (kg/ha)	4500	3900	3700	5800	5100	5600	5700
Price (Rs/kg) (consider 25 % premium on prevailing market price)	Rs. 20	/kg					

Cost of cultivation* (Rs /ha)	Rs. 62360
Net returns* (Rs/ha)	Rs. 51640

^{*}based on prices of 2013-14

Crop (summer): French bean

Important features of suitable varieties of French bean

Parameters	Naga local	RCM FB-18
Duration (days)	90-95	85-90
Average yield under organic condition	18000	16800
(kg/ha)		
Source (s) of availability	ICAR-RC Umiam	ICAR-RC Umiam
Suitable regions/districts in the state	Ri-Bhoi, Mid altitude of	Ri-Bhoi, Mid altitude of
	Meghalaya (800-1200 m	Meghalaya (800-1200 m
	ASL)	ASL)

Field preparation: After the harvest of maize, maize stubbles are cut at 1 m height for recycling of residues. Two furrow lines are made in between each row of maize for sowing of French bean seed. FYM, Rock phosphate, Neem cake @ 15 t/ha, 150 kg/ha and 100 kg/ha (on N and P₂O₅ equivalent basis) respectively are applied in the furrow lines and mixed with soil. Seeds are placed at a distance of 15 cm plant to plant and the seeds are covered with soil immediately after sowing.

Cultural practices of French bean

Seed rate (kg/ha)	25-30 kg/ha					
Pre-sowing/planting treatment of seed/seedlings	Material Recomme rate (kg/h lit/ha)		kg/ha or	Method of application		
	Trichoderma viride	5 g/kg of seed		Seed treatment		
Spacing (Row X plant) in cm	25 cm x 15 cm					
Basal application of organic	Source			Quantity/ha		
manures including soil	FYM			15 t/ha		
application of bio-fertilizers,	Neem cake			150 kg/ha		
bio-control agents etc	Rock phospha	te		200 kg/ha		
Top dressing of organic manures	Source	Quantity/ha		/plantin		Days after sowing /planting or stage of crop
	Panchagavya	25 1	itre/ha	20-25 DAS		
Irrigation practices	Number of irrigations	Most critical stages for irrigation		Depth of irrigation (cm)		
	The crop is grown under rainfed condition. However, life saving irrigation is given during dry spell					

Major weeds	Scientific name		Common name			
	Drymaria cordata		Tropic	cal chick weed		
	Commelina bengha	lensis	Day flower			
	Galinsoga parviflor	ra	Gallar	nt soldier		
	Oxalis corniculata		Sleepi	ng beauty		
	Chenopodium album L			's quarters		
Weed management	Critical stage of	Recommen	ided pi	ractice for organic		
	weeding			lition		
	30-35 DAS	One hand v	weeding	eding and hoeing along		
	with earthing up			up at about 30-35 DAS is		
		carried out	to sup	opress weed growth		
Organic plant protection	Name of	Organio	c	Quantity (kg or		
practices	pest/disease	materia	1	litres/ ha)		
		recommen	ded			
		for contr	ol			
	Anthracnose	Pestoneer	m	2.5 ml/lt		
	Rhizoctonia					
	blight Blister beetle Mites	Derison	1	2ml/lt		
Optimum stage of harvesting	Tender pods becom	e ready for ha	rvest fi	com 55-60 DAS		

Yield and Economics of French bean

Parameters	1 st *	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic yield (kg/ha)	13400	12900	22920	18530	22400	18000	19560
Price (Rs/kg) (consider 25 % premium on prevailing market price)	Rs. 15/k	g					
Cost of cultivation**(Rs/ha)	Rs. 7250	00					
Net returns** (Rs/ha)	Rs. 2209	900					

^{*}based on prices of 2013-14

Glimpses







Fig: Opening furrow lines

Fig: Applying rock phosphate in open furrow

Fig: Placing of seed in furrow lines





lines

Fig: Maize+soyabean (2:2 ratio)

Fig: Maize at physiological maturity stage

Fig: Maize cob ready for harvest







Fig: FYM

Fig: Vermicompost

Fig: Placing of FYM in furrow lines







Fig: French bean (RCM FB-18)



Fig: French bean pod ready for harvest

Details of Specific Practices/products used/recommended

Name of the input	Source and Preparation	Time, rate and purpose of application
Panchagavya	It is a cow excreta based indigenous nutrient solution. Panchagavya consists of nine	3% solution was found to be most effective compared to the higher and

	products viz. cow dung, cow urine, milk, curd, jaggery, ghee, banana, Tender coconut	lower concentrations investigated. 3 litres of Panchagavya to every 100
	and water. When suitably mixed and used, these have miraculous effects. The	litres of vater is ideal for all crops.
	preparation steps of panchagavya is as follows;	
Lantana leaf extract 10%	 7 kg. cow dung and 1 kg. cow ghee is mixed thoroughly both in morning and evening hours and is kept for 3 days. After 3 days, 10 lt. cow urine and 10 lt. water is added, mixed and kept for 15 days with regular mixing both in morning and evening hours. After 15 days the following ingredients are added and mixed Cow milk - 3 liters Cow curd - 2 liters Tender coconut water - 3 liters Jaggery - 3 kg Well ripened banana – 12 nos. Panchagavya is ready after 30 days. Leaves of <i>Lantana camara</i> were collected from the nearby area of the farm and 10% aqueous leaf extract is prepared firstly by grinding the leaves and then soaking 100g of grinded leaves in 200 ml. distilled water for 24 hours at a room temperature of 30°C. The aqueous extract was obtained by filtering the mixture (leaf and water) through a Whatman No .42 filter paper and diluted with distilled water to prepare 10% 	The extract is diluted with water @ 10% before spraying. This foliar spray act as insect-pest repellent. It can be sprayed 3-4 times during the crop duration according to pest infestation.
Derisom	It is a bio-pesticide based on botanical	It is applied as foliar spray @ 0.2%
	extract of Derris indica.	or 2 ml/lt. of water. It can be sprayed 2-3 times during the crop duration according to pest infestation. Derisom has Karanjin as active principle and acts as antifeedant and also acts on central nervous system of the Mites and Insect pests. Derisom works as Acaricide (Miticide) and Insecticide.

Pestoneem	Neem biopesticide is made from cold pressed neem kernels and its active azadirachtin 1500ppm is used as a general insecticide, fungicide and for coating urea for slow release	It is a bio-based pest controller containing 0.5% Azadirachtin and other vital bio-energizers. Application of pestoneem increase resistance to infestation of pest and disease.
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Punjab

Package of Practices for Organic Crop Production

Prepared by CS Aulakh, Sr Agronomist, Amandeep Kaur, Research Fellow Punjab Agricultural University, Ludhiana

Suggested cropping systems (based on testing under NPOF)

- 1. Maize-Potato-Summer moong
- 2. Turmeric-Onion
- 3. Basmati rice-Wheat-Green manure
- 4. Maize-Durum wheat-Cowpea (Fodder)
- 5. Maize-Berseem-Bajra fodder cropping system
- 6. Maize-Berseem-Maize+cowpea fodder cropping system

Details of Cropping Systems

Cropping System 1: Maize-Potato-Summer moong

Particulars	Kharif	Rabi	Summer	
Crop	Maize	Potato	Summer moong	
Fortnight of sowing/planting	2 nd fortnight of June	2 nd fortnight of Oct	1 st fortnight of April	
<u> </u>	1 st fortnight of Oct	1 st fortnight of March	1 st fortnight of June	
Varieties suitable for organic farming	Prabhat	Kufri Chandramukhi	SML 668	

Crop (kharif): Maize

Important features of suitable varieties

Parameters	Prabhat
Duration (days)	95
Source (s) of	PAU
availability	
Suitable	Punjab
regions/districts in the	
state	

Field preparation: Four ploughing (Disc harrow/Cultivator) and planking

Seed rate (kg/ha)	20				
Spacing (Row X plant) in cm	60 x 20				
Irrigation practices	Number	of	Most	critical	Depth of irrigation
	irrigations		stages	for	(cm)
			irrigation		

	5	7.5			
Major weeds	Commelina ber	Commelina benghalensis, Trianthema portulacastrum&			
	Brachiaria rept	ans			
Weed management	Critical stage	Recommended practice	ctice for organic		
	of weeding	condition			
	15-30 DAS	Hand weeding			
Organic plant protection	Name of	Organic material	Quantity (kg or		
practices	pest/disease	recommended for	litres/ ha)		
		control			
	Stem borer Tricho cards 40 cards/acre a				
			10-15 DAS		

Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic yield (kg/ha)	6120	7000	5320	5810	7110	-	-
Price (Rs/kg) (consider 25	12.25						
% premium on prevailing							
market price)							
Cost of	37,255						
cultivation*(Rs/ha)							
Net returns* (Rs/ha)	49,843						

^{*}based on prices of 2013-14

Crop (Rabi): Potato

Important features of suitable varieties

Parameters	Kufri		
	Chandramukhi		
Duration (days)	80-90		
Source (s) of	PAU		
availability			
Suitable	Punjab		
regions/districts in the			
state			

Field preparation: Ploughing (Mould board/ disc plough) and planking

Seed rate (kg/ha)	3750		
Spacing (Row X plant) in cm	60 x 20		
Basal application of organic	Source	Quantity/ha	
manures including soil	FYM (1% N)	12.5 t/ha	
application of bio-fertilizers,	VC (1.5% N)	4.25 t/ha	
bio-control agents etc			

Irrigation practices	Number of	Most critical	Depth of irrigation
	irrigations	stages for	(cm)
		irrigation	
	7	Tuber formation	7.5
Weed management	Critical stage	Recommended pra	ctice for organic
	of weeding	condition	
	30-45 DAS	Hand weeding	

Parameters	1 st *year	2 nd	3 rd	4 th	5 ^t	6 th	7 th
Economic yield	15600	14850	15280	20440	17200	-	-
(kg/ha)							
Price (Rs/kg)	6.86						
(consider 25 %							
premium on							
prevailing market							
price)							
Cost of	74,350						
cultivation*(Rs/ha)							
Net returns*	43,642			•		•	
(Rs/ha)							

^{*}based on prices of 2013-14

Crop (summer): Summer moong

Important features of suitable varieties

Parameters	SML 668
Duration (days)	60
Source (s) of availability	PAU
Suitable regions/districts in the state	Punjab
Specific resistance / tolerance to pest	Thrips
Specific resistance / tolerance to disease	Moongbean yellow mosaic virus

Field preparation: Two ploughing and planking (Disc harrow/Cultivator)

Seed rate (kg/ha)	37.5		
Pre-sowing/planting treatment	Material	Recommended rate	Method of
of seed/seedlings		(kg/ha or lit/ha)	application
	Rhizobium	0.5	Mixing with seed
Spacing (Row X plant) in cm	22.5 x 7		
Recommended NPK and micro	12.5 N, 40 P ₂ O ₂	5	
nutrient dose for the crop			

(kg/ha)				
Basal application of organic	Source	Quantity/ha	Source	Quantity/ha
manures including soil	FYM (1%	1.25 t/ha	FYM (1% 0.75 t/ha
application of bio-fertilizers,	N)		N)	
bio-control agents etc			VC (1.	5% 0.25 t/ha
			N)	
Irrigation practices	Number	of Most	critical	Depth of irrigation
	irrigations	stages	for	(cm)
	_	irrigation		
	4	Flowering	g	7.5
Weed management	Critical stage	of Recommo	ended prac	ctice for organic
	weeding	condition		_
	30-40 DAS	Hand wee	eding	

Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic yield (kg/ha)	900	1580	1330	1160	1240	-	-
Price (Rs/kg) (consider 25	42.50						
% premium on prevailing							
market price)							
Cost of cultivation*(Rs/ha)	19,525	•		•	•		
Net returns* (Rs/ha)	33,175						

^{*}based on prices of 2013-14

Cropping System 2: Turmeric-Onion

Particulars	Kharif	Rabi
Crop	Turmeric	Onion
Fortnight of sowing/planting	1 st fortnight of May	2 nd fortnight of Dec
Fortnight of harvesting	2 nd fortnight of Dec	2 nd fortnight of April
Varieties suitable for organic	Pb Haldi 1	Pb Naroa
farming		

Crop (kharif): Turmeric

Important features of suitable varieties

Parameters	Pb Haldi 1
Duration (days)	215
Source (s) of	PAU
availability	
Suitable	Punjab
regions/districts in the	
state	

Field preparation: Two plouging (Disc harrow/cultivatior) and planking

Seed rate (kg/ha)	2000						
Spacing (Row X plant) in cm	30 x 20						
Basal application of organic	Source	Quantity/ha Source Qua			Quantity/ha		
manures including soil	FYM (1% N)	15 t/ha	FYM	(1%	10 t/ha		
application of bio-fertilizers, bio-			N)				
control agents etc			VC	(1.5%	3.25 t/ha		
			N)				
Irrigation practices	Number of	Most o	critical	Depth	of irrigation		
	irrigations	stages	for	(cm)			
		irrigation					
	15	Rhizome		7.5			
		formation					
Major weeds	Eleusine indica		•		rum, cyperus		
	rotundus, Digita	,					
Weed management	Critical stage		ed pra	actice	for organic		
	of weeding	condition					
	30-45 DAS	II J					
		needed give one hoeing at 3 months					
	sowing the crop or give 3 hand weedi				_		
	at 1, 2 and 3 months of sowing the crop						
Optimum stage of harvesting	Complete yellowing and drying of plant						

Parameters		1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th
Economic	yield	62850	19750	25260	28650	27910	-	-
(kg/ha)								
Price (R	Rs/kg)	12.50						
(consider 25	%							
premium	on							
prevailing m	narket							
price)								
Cost	of	65,550						
cultivation*(Rs	/ha)							
Net ret	urns*	2,83,325						
(Rs/ha)								

^{*}based on prices of 2013-14

Crop (Rabi): Onion

Important features of suitable varieties

Parameters	Pb Naroa
Duration (days)	145

Source (s) of	PAU
availability	
Suitable	Punjab
regions/districts in the	
state	
Specific resistance /	Thrips,
tolerance to pest	Heliothis
Specific resistance /	Purple Blotch
tolerance to disease	

Nursery raising practices

Area of nursery required for 1 ha	62.5 m ²				
Nursery raising method	raised bed method				
Bed size (length X breadth in m)	2.5m x 1m				
Seed sowing rate/m ²	1 g				
Source and optimum quantity of organic manures/other nutrient	Materials	Quantity/ m ² area	Method of application		
source/m ² of nursery	FYM (1% N)	5 kg	Broadcast		
Weed management	Hand weeding	g			
Optimum age of nursery (days)	30 DAS				

Field preparation: One ploughing followed by planking

Cultural practices

Seed rate (kg/ha)	10					
Spacing (Row X plant) in cm	15 x 7.5					
Number of seedlings/hill (in	1-2					
nursery crops only)						
Basal application of organic	Source	Qι	ıantity/ha	Source		Quantity/ha
manures including soil	FYM (1%	10	t/ha	FYM (1	% N)	6.75 t/ha
application of bio-fertilizers,	N)					
bio-control agents etc				VC (1.5	% N)	2.25 t/ha
Imigation mastices	Name le ou	of	Mast suities	1 .4	Donath	of imication
Irrigation practices	Number	OI	Most critica	_	-	of irrigation
	irrigations		for irrigation		(cm)	
	12		Bulb format	10n	7.5	
Major weeds	Phalaris	min	ior, Medi	cago	denticu	late,Anagalis
	arvensis,Lepi	idiu	m sativa			
Weed management	Critical sta	ige	Recommend	led pra	ctice	for organic
	of weeding condition					
	30-45 DAT		Hand weedi	ng		
Optimum stage of harvesting	Tops dry up a	and	fall			

Yield and Economics

Parameters 1 st * year	2 nd	3 rd	4 th	5 th	
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Economic yield (kg/ha)	13750	12650	16930	18050	14890
Price (Rs/kg) (consider 25 %	8.40				
premium on prevailing					
market price)					
Cost of cultivation*(Rs/ha)	69,385				
Net returns* (Rs/ha)	55,241				

^{*}based on prices of 2013-14

Cropping System 3: Basmati rice-Wheat-Green manure

Particulars	Kharif	Rabi	Summer
Crop	Basmati Rice	Wheat	Sunhemp Green
			Manure
Fortnight of	1 st fortnight of July	2 nd fortnight of Nov	1 st fortnight of May
sowing/planting			
Fortnight of	1 st fortnight of Nov	2 nd fortnight of April	2 nd fortnight of July
harvesting			
Varieties suitable for	Punjab Basmati 2	PBW 621	PAU 1691
organic farming			

Crop (kharif): Basmati rice

Important features of suitable varieties

Parameters	Punjab Basmati 2
Duration (days)	140
Source (s) of availability	PAU
Suitable regions/districts in the	Punjab
state	

Nursery raising practices

Area of nursery required for 1 ha	500 m ²				
Nursery raising method	Flat bed sowi	ng			
Bed size (length X breadth in m)	10 m x 2 m p	lot s	ize		
Seed sowing rate/m ²	40 g				
Pre-sowing seed/soil treatment	Materials	Qι	antity/kg	Method	of application
	of seed or				
	per m ² area				
Source and optimum quantity of	Materials		antity/	Method	of application
organic manures/other nutrient		m^2	area		
source/m ² of nursery	FYM (1%	12	kg	Broadca	asting
	N)				
Organic plant protection practices	Name			Quantity/	
	pest/disease organic mater		material	m ² area	
	used for control				
	Stem borer		Tricho ca	rds	40 cards/acre

		at 5-6 times
Optimum age of nursery (days)	35-40	

Field preparation: Two ploughing (Disc harrow/Cultivator) and planking

Cultural practices

Seed rate (kg/ha)	20		
Spacing (Row X plant) in cm	20 x 15 cm		
Number of seedlings/hill (in nursery crops only)	1-2		
Irrigation practices	Number of irrigations	Most critical stages for	Depth of irrigation (cm)
	IIIIgations	irrigation	(CIII)
	5	Panicle initiation	7.5
Major weeds	Cyperus spp,	Eleusine indica,	Caesulia axillaris,
	Echinochloa cru.	sgalli, Ischaemum i	rugosum, Sphenoclea
	zeylanica		
Weed management	Critical stage of	Recommended p	ractice for organic
	weeding	condition	_
	30-40 DAT	Hand weeding	

Yield and Economics

Parameters	1 st year*	2 nd	3 rd
Economic yield (kg/ha)	2990	3120	2420
Price (Rs/kg) (consider 25 % premium	15.63		
on prevailing market price)			
Cost of cultivation*(Rs/ha)	17,718		
Net returns* (Rs/ha)	20107		

^{*}based on prices of 2013-14

Crop (Rabi): Wheat

Important features of suitable varieties

Parameters	PBW 621
Duration (days)	158
Source (s) of availability	PAU
Suitable regions/districts in the state	Punjab
Specific resistance / tolerance to disease	Brown rust,
	Yellow rust

Field preparation: Three ploughing fallowed by planking

Seed rate (kg/ha)	100			
Spacing (Row X plant) in cm	20 cm row sp	acing		
Basal application of organic	Source	Quantity/ha	Source	Quantity/ha

manures including soil	FYM (1%	30 t/ha	FYM (1	% N)	4.25 t/ha
application of bio-fertilizers,	N)				
bio-control agents etc			VC (1.5	% N)	2.75 t/ha
			NEC(2.5%	1.65 t/ha
			N)		
					_
Irrigation practices	Number	of Most	critical	Depth	of irrigation
	irrigations	stages	for	(cm)	
		irrigation	ı		
	5	CRI		7.5	
Major weeds	Chenopodium	album, Pl	halaris n	ninor,	Convolvulus
	arvensis, Rumex dentatus, Malva neglecta				
Weed management	Critical stage	of Recomm	ended pr	ractice	for organic
	weeding	condition	1		
	30-45 DAS	Hand we	eding		

Parameters	1 st year*	2 nd	3 rd
Economic yield (kg/ha)	3350	4440	4940
Price (Rs/kg) (consider 25 % premium	10.63		
on prevailing market price)			
Cost of cultivation*(Rs/ha)	12,658		
Net returns* (Rs/ha)	39,854		

^{*}based on prices of 2013-14

Crop (Summer): Sunhemp (Green manure)

Important features of suitable varieties

Parameters	PAU 1691
Duration (days)	45-60
Source (s) of availability	PAU
Suitable regions/districts in the state	Punjab

Field preparation: Ploughing and planking

Cultural practices

Seed rate (kg/ha)	50			
Spacing (Row X plant) in cm	22.5 cm row spacing			
Irrigation practices	Number of Most critical Depth of irrigation irrigation irrigation (cm)			
	3	-	7.5	

Cropping System 4: Maize-Durum wheat-Cowpea (Fodder)

Particulars	Kharif	Rabi	Summer
Crop	Maize	Durum wheat	Cowpea
Fortnight of	2 nd fortnight of June	2 nd fortnight of Oct	2 nd fortnight of April
sowing/planting			
Fortnight of	1 st fortnight of Oct	1 st fortnight of April	1 st fortnight of June
harvesting			
Varieties suitable for	Prabhat	PDW 291	Cowpea 88
organic farming			

Crop (kharif): Maize

Important features of suitable varieties

Parameters	Prabhat
Duration (days)	95
Source (s) of availability	PAU
Suitable regions/districts in the state	Punjab
Specific tolerance to drought/waterlogging	Lodging resistance

Field preparation: Four ploughing (Disc harrow/cultivator) and planking

Cultural practices

Seed rate (kg/ha)	20				
Spacing (Row X plant) in cm	60 x 20				
Basal application of organic	Source	Quanti	ty/ha		
manures including soil	FYM(1% N)	4.25 t/	na		
application of bio-fertilizers,	VC(1.5% N)	2.75t/h	/5t/ha		
bio-control agents etc	NEC(2.5% N)	1.65 t/	na		
Irrigation practices	Number of	Most critical	Depth of irrigation		
	irrigations	stages for	(cm)		
	irrigation				
	5 Tasselling 7.5				
Major weeds		•	ema portulacastrum&		
	Brachiaria reptar				
Weed management	_	· ·	practice for organic		
	weeding	condition			
	20-40 DAS	Hand weeding			
Organic plant protection	Name of	Organic material	Quantity (kg or		
practices	pest/disease	recommended for	litres/ha)		
		control			
	Stem borer	Tricho cards	40 cards/acre at 10-		
			15 DAS		

Yield and Economics

Parameters	1 st *year	2 nd	3 rd
Economic yield (kg/ha)	5190	4540	4200

Price (Rs/kg) (consider 25 % premium	6.75
on prevailing market price)	
Cost of cultivation*(Rs/ha)	17,723
Net returns* (Rs/ha)	10,627

^{*}based on prices of 2013-14

Crop (Rabi): Durum wheat

Important features of suitable varieties

Parameters	PDW 291
Duration (days)	155
Source (s) of availability	PAU
Suitable regions/districts in the state	Punjab
Specific resistance / tolerance to disease	Yellow rust, Brown rust, Karnal
	Bunt & Loose smut

Field preparation: Two ploughings followed by planking

Cultural practices

Seed rate (kg/ha)	100				
Spacing (Row X plant) in cm	20 cm row spacing				
Basal application of organic	Source Quantity/ha				
manures including soil	FYM(1% N)		4.25 t/ha		
application of bio-fertilizers, bio-	VC(1.5% N)		2.75t/ha		
control agents etc	NEC(2.5% N)		1.65 t/ha		
Irrigation practices	Number of	Most	critical	Depth	of irrigation
	irrigations	stages	for	(cm)	
	irrigation		on		
	5	CRI		7.5	
Major weeds	Chenopodium a	ılbum,	Phalaris	minor,	Convolvulus
	arvensis, Rumex	dentatus,	Malva neg	glecta	
Weed management	Critical stage of Recommended practice for organic			for organic	
	weeding condition				
	30-45 DAS	Hand w	eeding		

Yield and Economics

Parameters	1 st *year	2 nd	3 rd
Economic yield (kg/ha)	3570	5420	4870
Price (Rs/kg) (consider 25 % premium	10.63		
on prevailing market price)			
Cost of cultivation*(Rs/ha)	21,623		
Net returns* (Rs/ha)	30,145		

^{*}based on prices of 2013-14

Crop (Summer): Cowpea fodder

Field preparation: One ploughing followed by planking

Cultural practices

editarur praetices				
Seed rate (kg/ha)	50			
Spacing (Row X plant) in cm	30 cm row spacing			
Recommended NPK and micro	18.75 kg N, 55 Kg P ₂ O ₅			
nutrient dose for the crop (kg/ha)				
Irrigation practices	Number of Most critical Depth of irrigation			
	irrigations stages for (cm)			
	irrigation			
	4 - 7.5			
Weed management	Critical stage of	Recommended p	ractice for organic	
	weeding	condition		
	30-40 DAS	Hand weeding		
Organic plant protection	Name of	Organic material	Quantity (kg or	
practices	pest/disease	recommended for	litres/ ha)	
		control		

Yield and Economics

Parameters	1 st *year	2 nd	3 rd
Economic yield (kg/ha) (Green	24360	37270	31750
fodder)			
Price (Rs/kg) (consider 25 %	6 0.50		
premium on prevailing market price)			
Cost of cultivation*(Rs/ha)	6,552		
Net returns* (Rs/ha)	9,323		

^{*}based on prices of 2013-14

Cropping System 5: Maize-Berseem-Bajra fodder cropping system

Particulars	Kharif	Rabi	Summer
Crop	Maize	Berseem	Bajra
Fortnight of	1 st fortnight of Aug	1 st fortnight of Oct	1 st fortnight of June
sowing/planting			
Fortnight of	2 nd fortnight of Oct	1 st fortnight of June	1 st fortnight of July
harvesting			
Varieties suitable for	J 1006	BL 10	PCB 164
organic farming			

Crop (kharif): Maize

Important features of suitable varieties

Parameters	J 1006
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Source (s) of availability	PAU
Suitable regions/districts in the state	Punjab
Specific resistance / tolerance to disease	Maydis leaf blight, Brown Stripe
	downy mildew

Field preparation: Two ploughing (Disc harrow/Cultivator) and planking

Cultural practices

Seed rate (kg/ha)	75			
Spacing (Row X plant) in cm	30 cm row spacing			
Basal application of organic	Source	Quantity/ha		
manures including soil	FYM (1% N)	8.75 t/ha		
application of bio-fertilizers, bio-				
control agents etc				
Irrigation practices	Number of	Depth of irrigation (cm)		
	irrigations			
	8	7.5		
Major weeds	Commelina benghalensis, Trianthema portulacastrum&			
	Brachiaria reptans			
Weed management	Critical stage of	Recommended practice for organic		
	weeding	condition		
Optimum stage of harvesting	50-60 DAS			

Yield and Economics

Parameters	1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
Economic yield	16700	962	12040	14760	14610	13330	24520	38900
(kg/ha) (Green		0						
fodder)								
Price (Rs/kg)	1.3							
(consider 25 %								
premium on								
prevailing								
market price)								
Cost of	23600							
cultivation*(Rs/ha)								
Net returns*	26970							
(Rs/ha)								

^{*}based on prices of 2013-14 Crop (*Rabi*): Berseem

Important features of suitable varieties

Parameters			BL 10
Source	(s)	of	PAU

availability	
Suitable	Punjab
regions/districts in the	
state	

Field preparation: Three ploughing and Planking

Cultural practices

Seed rate (kg/ha)	20				
Pre-sowing/planting treatment of seed/seedlings	Material Recomm rate (k lit/ha)		ended g/ha or	Method of application	
	Rhizobium	0.5		Mixing with seed	
Basal application of organic	Source Quant			ha	
manures including soil	FYM (1%N)		2.5 t/ha		
application of bio-fertilizers, bio-					
control agents etc					
Irrigation practices	Number of	Depth of	of irrigation	(cm)	
	irrigations				
	6	7.5			
Major weeds	Poa annua, Trianthema potulacastrum			m	

Yield and Economics

1 st *year	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
78000	57370	67970	62760	62750	76810	61850	61100
1.00							
24350							
36750			·		·	·	
	78000 1.00 24350	78000 57370 1.00 24350 36750	78000 57370 67970 1.00 24350 36750	78000 57370 67970 62760 1.00 24350 36750	78000 57370 67970 62760 62750 1.00 24350 36750	78000 57370 67970 62760 62750 76810 1.00 24350 36750	78000 57370 67970 62760 62750 76810 61850 1.00 24350 36750

^{*}based on prices of 2013-14

Crop (Summer): Bajra

Important features of suitable varieties

Parameters	PCB 164
Duration (days)	50-60
Source (s) of availability	PAU
Suitable regions/districts in the state	Punjab
Specific resistance / tolerance to disease	Downy mildew

Field preparation: 2-3 ploughing

Cultural practices

Seed rate (kg/ha)	20			
Spacing (Row X plant) in cm	22 cm row spacing	g		
Recommended NPK and micro	50 kg N			
nutrient dose for the crop (kg/ha)				
Basal application of organic	Source		Quantity/ha	
manures including soil	FYM (1% N)		5 t/ha	
application of bio-fertilizers, bio-				
control agents etc				
Irrigation practices	Number of	Depth o	of irrigation (cm)	
	irrigations	-		
	8	7.5		
Major weeds	Commelina benghalensis, Trianthema portulacastrum&			
	Brachiaria reptans			
Optimum stage of harvesting	40-55 DAS			

Yield and Economics

Parameters		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
		year*							
Economic	yield	46500	75140	53470	31990	34130	26810	24270	34600
(kg/ha)	(Green								
fodder)									
Price	(Rs/kg)	1.25							
(consider	25 %								
premium	on								
prevailing	market								
price)									
Cost	of	13310							
cultivation*((Rs/ha)								
Net	returns*	29940				•	•		
(Rs/ha)									

^{*}based on prices of 2013-14

Cropping System 6: Maize-Berseem-Maize+Cowpea fodder cropping system

Particulars	Kharif	Rabi	Summer
Crop	Maize	Berseem	Maize + cowpea
Fortnight of	1 st fortnight of Aug	1 st fortnight of Oct	1 st fortnight of June
sowing/planting			
Fortnight of	2 nd fortnight of Oct	1 st fortnight of June	1 st fortnight of July
harvesting			
Varieties suitable for	J 1006	BL 10	J 1006+cowpea 88
organic farming			

Crop (kharif): Maize

Important features of suitable varieties

Parameters	J 1006
Source (s) of	PAU
availability	
Suitable	Punjab
regions/districts in the	
state	
Specific resistance /	Maydis leaf
tolerance to disease	blight, Brown
	Stripe downy
	mildew

Field preparation: Two ploughing (Disc harrow/Cultivator) and planking

Cultural practices

Seed rate (kg/ha)	75			
Spacing (Row X plant) in cm	30 cm row spacing			
Recommended NPK and micro	87.5 kg N			
nutrient dose for the crop (kg/ha)	_			
Basal application of organic	Source	Quantity/ha		
manures including soil	FYM (1% N)	8.75 t/ha		
application of bio-fertilizers, bio-				
control agents etc				
Irrigation practices	Number of Dep	oth of irrigation (cm)		
	irrigations	· -		
	8 7.5			
Major weeds	Eleusine indica, Trianthema potulacastrum			
Organic plant protection	Name of Quar	ntity (kg or litres/ ha)		
practices	pest/disease			
Optimum stage of harvesting	50-60 DAS			

Yield and Economics

Parameters	1 st year*	2 nd	3	4 th	5 th	6 th	7 th	8 th
Economic yield	19400	8850	10410	16850	12880	12880	26250	38500
(kg/ha)								
Price (Rs/kg)	1.3							
(consider 25 %								
premium on								
prevailing								
market price)								
Cost of	23600							
cultivation*(Rs/ha)								
Net returns*	26450			•	•			•
(Rs/ha)								

^{*}based on prices of 2013-14

Crop (Rabi): Berseem

Important features of suitable varieties

Parameters	BL 10
Source (s) of availability	PAU
Suitable regions/districts in the state	Punjab

Cultural practices

Seed rate (kg/ha)	20	
Basal application of organic	Source	Quantity/ha
manures including soil	FYM (1% N)	2.5 t/ha
application of bio-fertilizers, bio-		
control agents etc		
Irrigation practices	Number of	Depth of irrigation (cm)
	irrigations	
	6	7.5
Major weeds	Poa annua	

Yield and Economics

Parameters		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
		year*							
Economic y	yield	78800	56930	65490	71150	64500	79290	63490	61500
(kg/ha)									
Price (Rs	s/kg)	1.00							
(consider 25	%								
premium	on								
prevailing ma	arket								
price)									
Cost	of	24350							
cultivation*(Rs/h	na)								
Net retu	rns*	37150		·	·	·		·	
(Rs/ha)									

^{*}based on prices of 2013-14

Crop (Summer): Maize + Cowpea

Important features of suitable varieties

Parameters	J1006, Cowpea 88
Source (s) of availability	PAU
Suitable regions/districts in the state	Punjab

Field preparation: Two ploughing and planking

Seed rate (kg/ha) (Not	37.5+37.5
applicable for nursery crops)	
Spacing (Row X plant) in cm	30 cm row spacing

Basal application of organic	Source	Quantity/ha	
manures including soil	FYM (1% N)	8.75 t/ha	
application of bio-fertilizers,			
bio-control agents etc			
Irrigation practices	Number of	Depth of irrigation (cm)	
	irrigations		
	8	7.5	
Major weeds	Trianthema potulacastrum, Digitaria sanguinalis		
Optimum stage of harvesting	50-60 DAS		

Parameters		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
		year*							
Economic	yield	43200	40610	33020	34740	29330	30000	29470	34600
(kg/ha)									
Price	(Rs/kg)	1.3							
(consider 2	25 %								
premium	on								
prevailing	market								
price)									
Cost	of	22287							
cultivation*(R	Rs/ha)								
Net re	eturns*	27633							
(Rs/ha)									

^{*}based on prices of 2013-14

Tamil Nadu

Package of Practices for Organic Crop Production

Prepared by Dr. E. Somasundaram, Dr. S. Ramasamy and Dr. R. Parimala deviDepartment of Sustainable Organic Agriculture, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu.

Suggested cropping systems (based on testing under NPOF)

1. CS₁: Green manure-Cotton-Maize

2. CS₂: Green manure-Chillies-Sunflower

3. CS₃: Green manure-Beetroot-Maize

Details of Cropping Systems

Cropping System 1: Green manure-Cotton-Maize

Particulars	Kharif	Rabi	Summer
Crop	Cotton	Maize	Sunnhemp
Fortnight of sowing/planting	August 1 st fortnight	February 1 st fortnight	June 1 st fortnight
Fortnight of harvesting	January 2 nd fortnight	May 2 nd fortnight	July 1 st fortnight
Varieties suitable for organic farming	Suraj	CO(H)M6	Local

Crop (kharif): Cotton

Important features of suitable varieties

Parameters	MCU 12	Suraj
Duration (days)	160	165
Average yield under organic	2000 kg/ha	1799 kg/ha
condition (kg/ha)		
Source (s) of availability	-	CICR,
		Coimbatore
Suitable regions/districts in	Coimbatore, Erode, Madurai, Dindigul,	Coimbatore
the state	Theni, Dharmapuri, Salem, Namakkal,	
	Erode	

Field preparation:

Prepare the field to get a fine tilth. Chiselling for soils with hard pan: Chisel the soils having hard pan formation at shallow depths with chisel plough at 0.5 metre interval, first in one direction and then in the direction perpendicular to the previous one, once in three years. Form ridges and furrows 10 m long with 60 cm spacing by using ridge plough or bund former.

Seed rate (kg/ha)	7.5 kgs of delinted seeds				
Pre-	Mate		Recommended		Method of
sowing/planting			rate (kg/ha		I
treatment of			lit/ha)		
seed/seedlings	Azospirillum		600 g/ha		Seed treatment
_	Phosphobacteria		600 g/l	na	Seed treatment
	Pseudomonas			kg of	Seed treatment
			seed	Ü	
	Trichoderma		4 g/kg	of seed	Seed treatment
Spacing (Row x	60 x 30 cm				•
plant)					
Basal application	Å	Source			Quantity/ha
of organic manures	FYM			7.05 t/	/ha
including soil	Vermicompost			4.49 t/	'ha
application of bio-	Azospirillum			2kg/ha	a .
fertilizers, bio-	Phosphobacteria			2kg/ha	
control agents etc	Pseudomonas			2.5 kg	
	Trichoderma			2.5 kg	
Top dressing of	Source	Quantity,	/ha		Days after
organic manures		•	sowing/planting		
					stage of crop
	Vermicompost	1 t/ha	45 DAS		5 DAS
	Panchagavya	3% spray		30), 60 and 90 DAS
Irrigation practices	Number of	Most critical s	tages for	r I	Depth of irrigation
irrigation practices	irrigations	irrigatio			
	15-18 irrigations	Germination ph		-15	(CIII)
	depending on the	days)	iase (1	13	
	weather and soil	Vegetative pha	se (16	-44	
	type	days)	.50 (10		
	ij po	Flowering phase	se (85	-90	
		days)	(00		
Major weeds	Acalypha indica,	• '	lon, Cy	perus	rotundus, Digera
	arvensis, Chloris b	arbata, Trianthei	ma por	tulacasi	trum, Parthenium
	hysterophorus				
Weed management	Critical stage	of weeding	Reco	ommend	led practice for
				organie	c condition
	Vegetative and flowering phase Manua				_
		Stubble	mulchi		
Organic plant	Name of	iterial		Quantity (kg or	
protection	pest/disease recommended for control litres/ ha)				
practices	Fruit Application of Nuclear 3 x 10 ¹² POB /h			x 10 ¹² POB /ha	
	borer: Helicover Polyhedrosis Virus (NPV)				
	pa armigera in evening hours at 7th				
	and 12th week after sow			-	
		• Beauveria	bassi	ana	

T	Г	4 4 504 1110 400 //
	• Pologge of ogg managitaid	1.15% WP 400 g/ha
	• Release of egg parasitoid, Trichogramma spp.,	6.25 cc/ha at 15 days interval 3
	•Egg-larval parasitoid, <i>Chelonus blackburnii</i> and Predator <i>Chrysoperla</i>	times from 45 DAS 1,00,000/ha at 6 th ,
	carnea • ULV spray of NPV, for effective control of Helicoverpa	13 th and 14 th week after sowing. 3 x 10 ¹² POB /ha with 10% cotton seed kernel extract, with sticking agent
Pink bollworm: Pectin ophora gossypiella	 Use pheromone trap to monitor the adult moth activity Three weekly releases of 	
0 71	egg parasitoid Trichogramma sp	@1,00,000/ha per release
Cotton Stem Weevil: Pemphere s (Pempherulus) affinis and Shoot weevil: Alcidodes affaber	Basal application of neem cake	250 kg/ha
Tobacco Cutworm: Spodoptera litura	 Use of light trap Growing castor along border and irrigation bunds Removal and destruction of egg masses Removal and destruction of early stage larvae Hand picking and destruction of grown up caterpillars 	
Sucking pests	 Neem oil Neem seed kernel extract Fish oil rosin soap Notchi leaf extract Catharanthus rosea extract 	3% 5% 2.5 % 5% 5%
Foliar diseases - Alternaria leaf spot: Alternaria macrospora	Neem oil Bacillus subtilis	3% 0.04% on 60, 90 and 120 days after sowing

	Wilt : Fusarium oxysporum f. sp. vasinfectum	 Seed treatment with <i>Trichoderma viride</i> formulation Destroy the infected - plant debris. Soil application of <i>Trichoderma viride</i> 	4g/kg seed 2.5kg/ha
	Root Rot: Rhizoctonia bataticola	 Seed treatment with <i>T.</i> viride Seed treatment with Bacillus Soil application 	@ 4 g/kg seed@ 10g/kg seed@ 2.5 kg/ ha at the time of sowing
		 Seed treatment with Pseudomonas Soil application of Pseudomonas 	@ 10g/kg@ 2.5 kg/ha at the time of sowing
Optimum stage of harvesting	Boll bursting stage		

Parameters	1 st	2 nd	3 rd	4 th year	5 th	6 th	7 th year
	year*	year	year		year	year	
Economic yield	1323	1460	1175	1493	1515	1053	1165
(kg/ha)							
Price (Rs/kg)	Actual price: 45						
	25 % p	25 % premium price: 46.25					
Cost of	40,110						
cultivation*(Rs/ha)							
Net returns* (Rs/ha)	13,771						

Crop (Rabi) : Maize

Important features of suitable varieties

Parameters	CO1	COH(M)6
Duration (days)	10-110	110
Average yield under	5200	7400 kg/ha
organic condition		
(kg/ha)		
Source (s) of	TNAU	TNAU
availability		
Suitable	Coimbatore, Erode,	All maize growing areas
regions/districts in	Tirunelveli, Tanjore	
the state	and Pudukottai	

Specific resistance /	Resistant to	downy	Multiple	disease	resistance	to	Sorghum
tolerance to disease	mildewOrange	flint	downy	mi	ldew, Maya	lis	leaf
	grains		blight, Tu	rcicum le	af blight,	Post	flowering
			stock rot	and Band	ed leaf and	sheat	th blight

Field preparation:

Plough the field with disc plough once followed by cultivator ploughing twice, after spreading FYM or compost till a fine tilth is obtained. Form ridges and furrows providing sufficient irrigation channels. The ridges should be 6 m long and 60 cm apart using a bund former or ridge plough.

Seed rate	20 kg/ha			
Pre-sowing/planting	Material	Recommend	led rate (kg/ha	Method of
treatment of		or	lit/ha)	application
seed/seedlings	Azospirillum 600 g/ha			Seed treatment
	Phosphobacteria	600 g/ha		Seed treatment
Spacing (Row x plant) in	60 x 25 cm	·		
cm				
Basal application of	Source		Quantity/ha	
organic manures including	FYM		11.88 t/ha	
soil application of bio-	Vermicompost		7.57t/ha	
fertilizers, bio-control	Azospirillum		2kg/ha	
agents etc	Phosphobacteria		2kg/ha	
Top dressing of organic	Source	Quan	tity/ha	Days after
manures			·	sowing/planting
				or stage of crop
	Vermicompost	1 t/ha		30 DAS
Irrigation practices	Number of	Most critica	l stages for	Depth of
	irrigations	irrigation		irrigation (cm)
	9 to 11	Germination	&	-
	irrigations	establishment	phase-1	
	based on the	to 14	4 days	
	weather and	Vegetative ph	ase - 15 to 39	
	soil type	days		
		Flowering pha	ase - 40 to 65	
		days		
		Maturity phas	se - 66 to 95	
		days		
Major weeds		•	• • •	rotundus, Digera
	arvensis, Chloris	barbata,	Trianthema	portulacastrum,
	Parthenium hyste			
Weed management	Critical stage of weeding Recommended practical stage of weeding Condition • Vegetative phase • Manual weeding		v	
				_
	Flowering phase • Stubble mulching			
Organic plant protection	Name of	Organi	c material	Quantity (kg or

practices	pest/disease	recommended for control	litres/ ha)		
	Stem borer: Chilo	Release egg p[arasitoid	@		
	partellus	Trichogramma chilonis are	2,50,000 /ha		
		desirable. Third release is to	(three releases at		
		be accompanied	weekly interval)		
		with larval parasitoid			
		Cotesia flavipes @ 5000/ha			
	Corn	• Set up of light traps			
	worm/Earworm: <i>H</i>	•Set up sex pheromone	@ 12/ha		
	elicoverpa	traps			
	armigera	•Two applications of	$@ 1.5 \times 10^{12}$		
		NPV along with crude			
		sugar 2.5 kg + cotton	interval along		
		seed kernel powder 250	with crude		
		g on the ear heads	sugar 2.5 kg +		
		g on the car neads	cotton seed		
			<u> </u>		
			250 g on the ear		
			heads		
	Sucking pests	Neem oil	3%		
		Neem seed kernel extract			
		Fish oil rosin soap			
	Foliar diseases	Neem oil	3%		
Optimum stage of	Observe the follow	ving symptoms, taking into c	onsideration the		
harvesting	average duration o				
	i. The sheath covering the cob will turn yellow and dry at				
	maturity.				
	ii. The seeds become fairly hard and dry. At this stage the crop				
	is ready for harvest.				
	is ready for flatves				

Parameter	'S	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th
		year*						
Economic	yield	3753	4123	4078	3757	4064	4144	5481
(kg/ha)								
Price (R	Rs/kg)	Actual	price: Rs.1	2.5				
(consider 25	%	25 % p	remium on	prevailin	ig market p	price:Rs.1:	5.62	
premium	on							
prevailing m	narket							
price)								
Cost	of	Rs.48,678						
cultivation*(Rs.	/ha)							
Net returns* (F	Rs/ha)	Rs.36,963						

*based on prices of 2013-14 **Crop** (Summer): Sunnhemp

Important features of suitable varieties

Parameters	Sunnhemp
Duration (days)	150 days
Average yield under organic condition (kg/ha)	Green biomass: 13-15 t/ha
Source (s) of availability	TNAU
Suitable regions/districts in the state	All districts of Tamil Nadu

Field preparation: Plough the soil to fine tilth, broadcast the seeds and form ridges and furrows 60 cm.

Cultural practices

Seed rate (kg/ha)	25-35 kg/ha for green manure				
Pre-sowing/planting treatment of	Material Recommended Method of				
seed/seedlings		rate (kg/ha or	application		
		lit/ha)			
	Rhizobium	1 kg/ha	Seed treatment		
Spacing (Row X plant) in cm	mixing with 25 kg sa	and			
Irrigation practices	Once in 30 days				
Major weeds	Trianthema po	rtulacastrum, Parthe	nium hysterophorus		
Weed management	Hand hoeing and removal				
Organic plant protection	Neem oil: 3% spraying				
practices					
Optimum stage of harvesting	Incorporation during flowering stage or 45 DAS				

Yield and Economics: Incorporated as green biomass at 45 DAS

Cropping System 2: Green manure-Chillies-Sunflower

Particulars	Kharif	Rabi	Summer
Crop	Chillies	Sunflower	Sunnhemp
Fortnight of	August 1 ^{rst} fortnight	February 2 nd fortnight	June 2 nd fortnight
sowing/planting			
Fortnight of	February 1 ^{rst} fortnight	June 1 ^{rst} fortnight	July 2 nd fortnight
harvesting			
Varieties suitable for	PKM1	COSFV5	Local
organic farming			

Crop (kharif): Chillies

Important features of suitable varieties

Parameters	PKM1	K1
Duration (days)	180	210
Average yield under organic condition (kg/ha)	3.08 tonnes/ha –dry pod	1.8 tonnes/ha- dry pod

Source (s) of availability	TNAU	TNAU
Suitable regions/districts in the	Rainfed and irrigated	Southern Districts of Tamil
state	conditions	Nadu, Coimbatore

Nursery raising practices:

Seed rate

Varieties: 1.0 kg / ha.

Nursery area: 100 sq.m / ha.

Nursery raising: Protray nursery

- Mix sterilized cocopeat @ 300 kg with 5 kg neem cake along with *Azospirillum* and phosphobacteria each @ 1 kg. Approximately 1.2 kg of cocopeat is required for filling one protay. 300 protrays (98 cells) are required for the production of 29,000 seedlings, which are required for one hectare adopting a spacing of 90 x 60 x 45 cm in a paired row system.
- Sow the seeds in protrays @ 1 seed per cell.
- Cover the seed with cocopeat and keep the trays one above the other and cover with a polythene sheet till germination starts.
- After 6 days place the protrays with germinated seedlings individually on the raised beds inside the shade net.
- Water with rosecan everyday upto seed germination.

Field preparation:

Thoroughly prepare the field and form ridges and furrows at a spacing of 60 cm. Irrigate the furrows and transplant 40-45 days old seedlings, with the ball of earth on the ridges.

Pre-sowing/planting treatment of seed/seedlings	Material		mended	Method of application
or seed/seedings		rate (kg/ha or lit/ha)		иррисанон
	Azospirillum	400 g/ha	l	Seedling root dip
	Phosphobacteria	400 g/ha	l	Seedling root dip
Spacing (Row x plant) in cm	60 x 45 cm			
Number of seedlings/hill	2			
Basal application of organic	Source			Quantity/ha
manures including soil	FYM		7.50 t/ha	
application of bio-fertilizers,	Vermicompost		3.09 t/ha	
bio-control agents etc	Azospirillum		2kg/ha	
	Phosphobacteria		2kg/ha	
	Pseudomonas		2.5 kg/ha	,
	Trichoderma		2.5 kg/ha	,
Top dressing of organic	Source	Quantit	ty/ha	Days after
manures				sowing/planting or
				stage of crop
	Vermicompost	1 t/ha		45 DAS

	Panchagavya	3% spray	30, 60, 90 and 120 DAS
Irrigation practices	Number of irrigations	Most critical stages for irrigation	Depth of irrigation (cm)
	18-24 irrigations depending on the weather and soil type	Irrigation is done at weekly	-
Major weeds	Acalypha indica, Digera arvens	Cyanodon dactylon is, Chloris barb arthenium hysteroph	*
Weed management	Critical stage of weeding Vegetative and flowering phase	con	practice for organic adition ace in 30 days after
Organic plant protection practices	Name of pest/disease Fruit borer	Organic material recommended for control • Set up pheromone traps for Helicoverpa armigera or Spodoptera litura • Collection and destruction of damaged fruits and grown up caterpillars. • Spray Bacillus	Quantity (kg or litres/ ha) @ 12 Nos./ha.
	Sucking pests	Neem oil Neem seed kernel extract	@ 2 g/lit 3% 5%

	Damping off and	• Seed treatment	
	anthracnose	with	
		Trichoderma	@ 4 g/kg
		viride	
		or	
		Pseudomonas	@ 10 g/kg
		fluorescens	
		 Soil application 	@ 2.5 kg/ha
		of	
		Pseudomonas	
		fluorescens	
		• Neem oil	@ 3%
Optimum stage of harvesting	Fruit maturation s	tage	

Parame	eters	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th
		year*						
Economic	yield	3168	5345	3153	5526	5812	4483	6215
(kg/ha)								
Price	(Rs/kg)	Actual	price: 18					
(consider	25 %	25 % p	remium pr	ice: 22.50)			
premium	on							
prevailing	market							
price)								
Cost	of	92,560						
cultivation*(Rs/ha)								
Net returns*	(Rs/ha)	47,278						

^{*}based on prices of 2013-14

Crop (Rabi): Sunflower

Important features of suitable varieties

Parameters	TNAU Sunflower Hybrid CO 2	COSFV 5
Duration (days)	90-95	85-90
Average yield under organic condition (kg/ha)	2250	1700
Source (s) of availability	TNAU	TNAU
Suitable	Coimbatore, Erode, Salem,	Coimbatore, Erode, Salem,
regions/districts in	Namakkal, Tirunelveli, Dindigul,	Namakkal, Tirunelveli, Dindigul,
the state	Dharmapuri, Tiruchirapalli,	Dharmapuri, Tiruchirapalli,
	Perambalur, Karur, Cuddalore,	Perambalur, Karur, Cuddalore,
	Villupuram, Virudhunagar,	Villupuram, Virudhunagar,
	Sivagangai, Ramanathapuram,	Sivagangai, Ramanathapuram,
	Madurai, Theni, Thoothukudi,	Madurai, Theni, Thoothukudi

Field preparation:

Plough once with tractor or twice with iron-plough or three to four times with country-plough till all the clods are broken and a fine tilth is obtained. Spread 12.5 t/ha of FYM or compost or composted coir pith evenly on the field before the last ploughing and incorporate in the soil by working with a country plough. Form ridges and furrows 6 m long. Use bund-former or ridge plough to economise and form irrigation channels across and ridges according to the topography of the field.

Seed rate	6 kg/ha			
Pre-	Material	Recommended rate (kg.	/ha or lit/ha)	Method of
sowing/plan			application	
ting	Azospirillum	600 g/ha		Seed
treatment of				treatment
seed/seedlin	Phosphobacteria	600 g/ha		Seed
gs				treatment
	Trichoderma	4g/kg		Seed
				treatment
Spacing	45 cm x 30cm			
(Row x				
plant) in cm				
Basal		Source	Quantity/h	а
application	FYM	5.30		
of organic	Vermicompost	3.37t		
manures	Azospirillum	2kg/l		
including	Phosphobacteria	2kg/l	na	
soil				
application of bio-				
fertilizers, bio-control				
agents etc				
Top	Source	 Quantity/ha		Days after
dressing of	Source	Quantity/na		sowing/plan
organic				ting or
manures				stage of
				crop
	Vermicompost	500 kg/ha		30 DAS
	Panchagavya	3%		30, 45 and
				60 DAS
Irrigation	Number of	Most critical stages for irrigati	Depth of	
practices	irrigations	Ç Ç		irrigation
	_			(cm)
	10-12	Seeding, flowering and see	ed development	-
	irrigation	stage		
	depending on			

	the weather					
	and soil type					
Major	Acalypha indica					
weeds	arvensis, Chloris barbata, Trianthema portulacastrum, Parthenium					
	hysterophorus					
Weed	Critical stage of	Recommended practice for organic c	ondition			
managemen	weeding					
t	Vegetative phase	se Manual weeding				
	Flowering phase	Stubble mulching				
Organic	Name of	Organic material recommended for control	Quantity			
plant	pest/disease		(kg or			
protection			litres/ ha)			
practices	Capitulum borer	•Sow trap crops like marigold at 50				
	(Head	plants/acre				
	borer): Helicover	•Use of pheromone traps for pest intensity				
	pa armigera	identification as well as to trap the male				
		moths	4 traps/acre			
		• Setting of light traps to know the range of	_			
		pest incidence as well as to kill moth				
		population				
		•Release predators like	1 light			
		coccinellids, Chrysoperla carnea	trap/5 acre			
		• Release parasitoides				
		like Trichogramma spp, (Bracon spp., Ca	@1larva/			
		mpoletis spp)	head			
		•Spraying of 5% Neem oil or 5% Neem				
		Seed Kernal extract before egg laying				
			@			
			20,000/acre			
	Bihar hairy	Deep summer ploughing				
	caterpillar: Spilos	•Use of well rotten manures				
	oma oblique	Collection and destruction of larvae				
	Tobacco	•Hand pick the <i>Helicoverpa</i> larvae and				
	caterpillar: Spodo	destroy				
	ptera litura	· · · · · · · · · · · · · · · · · · ·				
	Picia illina	•Install bird perches per hectare for predatory birds				
	Leaf hopper	Neem oil	3%			
	(jassids): Amrasc		5%			
	a biguttula	Neem seed kernel extract	570			
	biguttula					
	Foliar diseases	Neem oil	3%			
	Charcoal Rot:	Soil application of <i>P. fluorescens</i> or <i>T.</i>	2.5 kg / ha			
	Macrophomina	viride	+ 50 Kg of			
L	I	L				

	phaseolina		well
			decompose
			d FYM or
			sand at 30
			days after
			sowing
Optimum	Observe the bracts	on the backside of the capitula. When they turn	n lemon
stage of	yellow, the heads ha	arden and the crop is ready for harvest.	
harvesting	•	•	

Parame	eters	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th
		year*						
Economic	yield	1252	1227	1023	1349	1602	1304	1373
(kg/ha)								
Price	(Rs/kg)	Actual	price: 25					
(consider	25 %	25 % p	remium or	n prevailir	ng market j	price: 31.2	25	
premium	on							
prevailing	market							
price)								
Cost	of	21,918						
cultivation*	(Rs/ha)							
Net	returns*	20,988						
(Rs/ha)								

^{*}based on prices of 2013-14 Crop (summer): Sunhemp

Important features of suitable varieties

Parameters	Sunnhemp
Duration (days)	150 days
Average yield under organic condition (kg/ha)	Green biomass – 13-15 t/ha
Source (s) of availability	TNAU
Suitable regions/districts in the state	All districts of Tamil Nadu

Field preparation: Plough the soil to fine tilth, broadcast the seeds and form ridges and furrows 60 cm.

Seed rate (kg/ha) (Not applicable 25-35 kg/ha for green manure				
for nursery crops)				
Pre-sowing/planting treatment of	Material	Recommended	Method of	
seed/seedlings		rate (kg/ha or	application	
		lit/ha)		
	Rhizobium	1 kg/ha	Seed treatment	
Spacing (Row x plant) in cm	Broadcasted	1	1	

Irrigation practices	Once in 30 days
Organic plant protection practices	Neem oil: 3% spraying
Optimum stage of harvesting	Incorporation during flowering stage or 45 DAS

Yield and Economics: Incorporated as green biomass at 45 DAS

Cropping System 3: Green manure-Beetroot-Maize

Particulars	Kharif	Rabi	Summer
Crop	Beetroot	Maize	Sunnhemp
Fortnight of	July 1 st fortnight	Novemebr 1 st	March 1 ^{rst} fortnight
sowing/planting		fortnight	
Fortnight of	September	February 2 nd fortnight	April 2 nd fortnight
harvesting	2 nd fortnight		
Varieties suitable for	Ruby queen	CO(H)M6	Local
organic farming			

Crop (kharif): Beetroot

Important features of suitable varieties

Parameters	Ruby queen
Duration (days)	60-75 days
Average yield under organic condition (kg/ha)	
Source (s) of availability	Private industry
Suitable regions/districts in the state	Widely adaptable (Preferably cool weather)

Field preparation:

Land is ploughed to a fine tilth by thorough ploughing making it loose and friable. Clods are to be removed completely. Apply well decomposed farmyard manure at the time of final ploughing.

Seed rate (kg/ha)	6 kg/ha		
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended Method of rate (kg/ha or application lit/ha)	
Spacing (Row x plant) in cm	30 x 10 cm		
Basal application of organic	Source	ce Quantity/ha	
manures including soil	FYM	3.75 t/ha	
application of bio-fertilizers,	Vermicompost	1.55 t/ha	
bio-control agents etc			
Top dressing of organic	Source	Quantity/ha	Days after

manures			sowing/planting or
			stage of crop
	Vermicompost	500 kg/ha	45 DAS
	Panchagavya	3% spray	30, 45 and 60 DAS
Irrigation practices	Number of	Most critical	Depth of irrigation
	irrigations	stages for	(cm)
		irrigation	
	8 - 10 irrigations	Irrigation is	
	depending on the	done at weekly	
	weather and soil	intervals	
	type		
Major weeds	Acalypha indica, Cyanodon dactylon, Cyperus rotundus		
	Digera arvensi	is,Chloris barb	ata, Trianthema
	portulacastrum, Parthenium hysterophorus		
Weed management	Critical stage of Recommended practice for organ		
	weeding	con	ndition
	Early stage of	Hand weeding or	nce in 30 days after
	crop growth	sowing	
Organic plant protection	Name of	Organic	Quantity (kg or
practices	pest/disease	material	litres/ ha)
		recommended	
		for control	
	Leaf miners, web	Neem oil	3%
	worms, semi		
	loopers		
	Cercospora leaf	Neem oil	3%
	spot		
		l	

Parameters	1 st year*
Economic yield (kg/ha)	24.8 t/ha
Price (Rs/kg)	Actual price: Rs.10
	25 % premium price: rs.12.5
Cost of cultivation*(Rs/ha)	Rs.86,015
Net returns* (Rs/ha)	Rs.2,23,985

^{*}based on prices of 2013-14

Crop (Rabi) : Maize

Important features of suitable varieties

Parameters	COH(M)6
Duration (days)	110
Average yield under	7400 kg/ha
organic condition (kg/ha)	
Source (s) of availability	TNAU
Suitable regions/districts	All maize growing areas

in the state	
Specific resistance /	Moderately resistant to stem borer
tolerance to pest	
Specific resistance /	Multiple disease resistance to Sorghum downy mildew, Maydis
tolerance to disease	leaf blight, Turcicum leaf blight, Post flowering stock rot and
	Banded leaf and sheath blight

Field preparation:

Plough the field with disc plough once followed by cultivator ploughing twice, after spreading FYM or compost till a fine tilth is obtained. Form ridges and furrows providing sufficient irrigation channels. The ridges should be 6 m long and 60 cm apart using a bund former or ridge plough.

Seed rate	20 kg/ha			
Pre-sowing/planting	Material	Recommend	ed rate (kg/ha	Method of
treatment of		or l	it/ha)	application
seed/seedlings	Azospirillum	600 g/ha		Seed treatment
	Phosphobacteria	600 g/ha		Seed treatment
Spacing (Row x plant) in cm	60 x 25 cm			
Basal application of	Source		Quantity/ha	
organic manures including	FYM		11.88 t/ha	
soil application of bio-	Vermicompost		7.57t/ha	
fertilizers, bio-control	Azospirillum		2kg/ha	
agents etc	Phosphobacteria		2kg/ha	
Top dressing of organic manures	Source	Quant	ity/ha	Days after sowing/planting or stage of crop
	Vermicompost	1 t/ha		30 DAS
Irrigation practices	Number of irrigations 9 to 11	Most critical irrigation Germination	stages for &	Depth of irrigation (cm)
	irrigations	establishment	phase-1	
	based on the	to 14	J	
	weather and	Vegetative ph	ase - 15 to 39	
	soil type	days		
		Flowering pha	ase - 40 to 65	
		days	66 4 05	
		Maturity phas	se - 66 to 95	
Maionywaeda	A = =1-==1- == 1- == 1-	days	Avilon Crime	matura dura Di-
Major weeds	arvensis, Chloris		Trianthema	rotundus, Digera portulacastrum,
	Parthenium hyst			
Weed management	Critical stage of	weeding Red	commended pra	ctice for organic

			condi	ition
	 Vegetative 	phase	 Manual weedin 	g
	Flowering phase	se	• Stubble mulchi	ng
Organic plant protection	Name of	Or	ganic material	Quantity (kg or
practices	pest/disease		mended for control	litres/ ha)
	Stem borer: Chilo partellus	desirable be with	egg parasitoid ramma chilonis are e. Third release is to accompanied larval parasitoid flavipes @ 5000/ha	@ 2,50,000 /ha (three releases at weekly interval)
	Corn worm/Earworm: <i>H</i> elicoverpa		o of light traps up sex pheromone	@ 12/ha
	armigera Sucking pests	•Two NPV sugar seed I g on t		@ 1.5 x 10 ¹² POB at 10 days interval along with crude sugar 2.5 kg + cotton seed kernel powder 250 g on the ear heads
			seed kernel extract l rosin soap	
	Foliar diseases	Neem o	-	3%
Optimum stage of harvesting	average duration o i. The sheath cover maturity.	f the cro ering the me fairly	ptoms, taking into cp. cob will turn yellov hard and dry. At th	v and dry at

Param	eters	1 st year*
Economic	yield	4015
(kg/ha)		
Price	(Rs/kg)	Actual price:Rs. 12.5
(consider	25 %	25 % premium on prevailing market price: Rs.15.625
premium	on	
prevailing	market	
price)		
Cost	of	Rs.49,209
cultivation*	(Rs/ha)	
Net returns	* (Rs/ha)	Rs.11,625

*based on prices of 2013-14 **Crop** (*summer*): **Sunnhemp**

Important features of suitable varieties

Parameters	Sunnhemp
Duration (days)	150 days
Average yield under organic condition (kg/ha)	Green biomass – 13-15 t/ha
Source (s) of availability	TNAU
Suitable regions/districts in the state	All districts of Tamil Nadu

Field preparation: Plough the soil to fine tilth, broadcast the seeds and form ridges and furrows 60 cm.

Cultural practices

Seed rate (kg/ha)	30 kg/ha for gre	en manure	
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application
	Rhizobium	1 kg/ha	Seed treatment
Spacing (Row X plant) in cm	Broadcasted		
Irrigation practices	Once in 30 days		
Organic plant protection practices	Neem oil: 3% spraying		
Optimum stage of harvesting Incorporation during flowering stage or 45 DA			or 45 DAS

Yield and Economics: Incorporated as green biomass on 45 DAS

Uttar Pradesh

Package of Practices for Organic Crop Production

Prepared by Dr. N. K. Jat, Dr. R. S. Yadav, Dr. Sudhir Kumar Dr. Chandra Bhanu, Dr. Prem Singh and N. RavisankarICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut (UP)- 250 110

Suggested cropping system (based on testing under NPOF)

- 1. Basmati rice wheat Sesbania green manure
- 2. Corse rice—barley + mustard mungbean
- 3. Maize (grain) potato– okra
- 4. Maize (green cobs) mustard + radish *Sesbania* green manure

Cropping System 1:

Particulars	Kharif	Rabi	Summer
Crop	Basmati rice	wheat	Sesbania green
			manure
Fortnight of	First fortnight of	Second fortnight of	Second fortnight of
sowing/planting	July	November	April
Fortnight of	First fortnight of	First fortnight of April	Incorporation in soil
harvesting	November	First fortnight of April	after 45 DAS
Varieties suitable			
for organic	Basmati-370	PBW-343	
farming			

Crop (kharif): Basmati rice

Important features of suitable varieties:

Parameters	Basmati-370	Pusa Basmati- 6	Pusa Basmati- 2
Duration (days)	145-150 days	150-155 days	120 days
Average yield under organic condition (kg/ha)	3142	4300	3700
Suitable regions/districts in the state	Haryana and western UP	J /	Punjab, Haryana, Delhi, Western Uttar Pradesh and Uttaranchal system

Nursery raising practices

Area of nursery required for 1 ha	100 m ²
Nursery raising method	Wet nursery
Bed size (length X	Keep saturated for initial 5 days & then maintain 5 cm water
breadth in m)	
Seed sowing rate/m ²	250 g (25 kg/ha)

Pre-sowing seed/soil treatment	Materials	Quantity/kg of seed or per m ² area	Method of application
	Pseudomonas fluorescence	10 g/kg seed	Seed treatment
	Trichodermaharzianum	4 g/kg seed	
Source and optimum	Materials	Quantity/	Method of
quantity of organic		m ² area	application
manures/other nutrient	FYM	2 kg	Soil incorporation
source/m ² of nursery	Vermicompost	1 kg	Top dressing at 15 DAS
Irrigation practices	Keep saturated the soil:	for initial 5 days an	d gradually increase
	water up to 5 cm	-	-
Weed management	One hand weeding at 15	DAS	
Organic plant protection practices	Name of pest/disease	Recommended organic mater	Quantity/ rial m ² area
practices		used for control	iai ili aica
	Seed borne diseases	Solar seed treatmer	For 2 hrs. during mid day after presoaking for 2 hrs.
	Soil borne diseases	Seed & seedl treatment was Pseudomonas fluorescence Trichoderma harzianum	ing Pseudomonas vith @ 10 g/kg seed & & Trichoderma @ 4 g/kg seed
Optimum age of nursery (days)	25 days		

Field preparation: Firstincorporation of green manure should be done by two cross harrowing at least 20 days before transplanting. After incorporation, a heavy irrigation should be done which helps in decomposition of debris of green manure. Around 15 days after green manure incorporation, sufficient water should be applied in the field for puddling. Before puddling, about 30 cm high earthen bunds should be made around the field. Pudddle the field around 3-4 runs of puddler in standing water. After one or two days of pudling, divide the field in to narrow beds of 1.25 meter width and of any convenient length and transplanting should be done in 3-5 cm standing water.

Pre-sowing/planting	Material	Recommended	Method of
treatment of seed/seedlings		rate (kg/ha or	application
		lit/ha)	
	Pseudomonas	2.5 kg/ha	
	fluorescence		Seedling treatment
	Trichoderma	5 kg/ha	
	harzianum		

Carrier (ware V aloud) in	20 10					
Spacing (row X plant) in cm	20 x 10					
Number of seedlings/hill	2					
Basal application of organic	Source			Quantity	uantity/ha	
manures including soil	FYM			12 t/ha	, 114	
application of bio-	Azotobactor			10 kg/ha		
fertilizers, bio-control	PSB			10 kg/ha		
agents etc.	Trichoderma			5 kg/ha		
	Neem cake			200 kg/h	a	
Top dressing of organic	Source		Quantit	y/ha	Days after	
manures					sowing/planting or stage of crop	
	Vermicompost		4.84 t/ha	l	30	
	Panchagavvya		15 lit./ha	ı	Spray twice at 45 and	
					60 days after	
					transplanting	
Irrigation practices	Number	of	Most	critical	Depth of irrigation	
	irrigations		stages	for	(cm)	
	1.0		irrigatio	n		
	10		Panicle		5 (intermittent	
			initiation flowerin	*	submergence)	
Major weeds	Local name	Fno	lish nam		Scientific name	
Wagor weeds	Grasses	12118	311311 Haili		belefitific flame	
	Makra ghas	Cro	w foot	Dacty	yloctenium aegyptium	
	Takri	_	ograss	Digit	aria ciliaris	
	Sewai/Sawa		nyardgras		nochloa colona	
	Samak/Sawa		nmon nyard gras	s Echir	ochloa crusgalli	
	Jharnpriya		an Goose			
	kodu	gras	S	Eleus	rine indica	
	Kangni	Yell	low foxtai	il Setar	ia glauca	
	Broad leaf wee	ds				
	Kalmua/Kalmi saag/Karemu	Moi	rningglori	es <i>Ipom</i>	oea aquatica	
	Agni Booti		tering nania	Amm	annia bassifera	
	Kankaua	Day	flower	Comi	nelina benghalensis	
	Sedges					
	Motha		e sedge	Cypri	us spp.	
	Jhirua	Gra: Fim	ss like bry	Fimb	ristylis miliacea	
Weed management	Critical stage o		•		mmended practice rganic condition	
	20 days after tra	nspla	nting		weeding	
	60 days after tra				weeding	
	y		<u> </u>		nuous water stagnation	

		till jointing stage				
Organic plant protection practices	Name pest/disease	of Recommended organic material/pract used for control	Quantity/ m ² area			
	Diseases					
	Seed borne diseases (Bacterial leaf blight, brown spot, blast,	Seed treatment with hot water	At 52 ^o C for 15-20 minutes			
	sheath blight)	Seed treatment with <i>Pseudomonas</i> fluorescence and/or <i>Trichoderma</i> spp. Before sowing (after hot water treatment)	10g/kg seed			
		Seedling dip for 2 hrs with Pseudomonas fluorescence and/or Trichoderma spp. Before transplanting	10g/L water			
	Soil borne diseases	Soil application of Pseudomonas fluorescence and /or Trichoderma harzianum Growing nursery in soil solarized seed beds	5 kg/ha			
	Bacterial leaf blight, sheath blight and blast	Foliar spray with Pseudomonas fluorescence and/or Trichoderma spp. At tillering, mid crop and panicle emergence stage.	suspension/ha)			
	Blast	Early sowing	By end of June to first week of July			
		Foliar spray of	10% (two sprays at 10			

	1	1	•	1	1 0
		cow	urine extract	days	interval after
	Duorran on ot	Duos	ما ما ما ما ما		ance of disease)
	Brown spot		vide proper	Apply	
		nuu	ition to crop		through organic
	Chaoth blight	Fali	on onnov vyith	manure	
	Sheath blight		ar spray with udomonas	_	water (1000 L
				suspens	sion/ha)
		and	rescence		
			hoderma spp.		
			tillering, mid and panicle		
		_	-		
			rgence stage. truction of		
			rnative weeds		
			from border		
			within the		
	Doctorial last	crop	noval of water		
	Bacterial leaf				
	blight		n field for few		
		_	s immediately		
			r appearance of		
	Doot Irant		symptoms	£ 1, ~ /l. o	
	Root knot		application of	5 kg/ha	
	nematode		hoderma 		
		-	zianum		
			w nursery in		
			solarized seed		
	T	beds	S		
	Insect pests	T	D	2 41 1	
	Borers/ leaf fold	ers	Pruning of leaf	-	
			nursery	before	
			transplanting		50000
			Release	of	50000
			Trichogramma		parasitized
			(Trichocards)-	egg	eggs/ha (5-6
			parasitoid in s	_	releases)
			crop based		
			monitoring of	-	
			* *	hrough	
	T C	,.	light traps		G 1 10 1
		ting	Foliar spray		Crush 10 kg
	caterpillars/leaf		Ginger-chilli-ga	rlic	garlic, 5 kg
	folders		extract		ginger and 5 kg
					green chilli in
					70 L water.
					Apply extract
					@60L/ha
1	Foliar pests		Foliar spray of	of cow	Spray two days

	dung gove uring noom	fermented
	dung-cow urine- neem	
	leaf extract	extract of 2L
		cow urine, 1kg
		cow dung and
		2kg crushed
		neem leaves in
		1000L water.
Gundhi bug	Foliar application of	The extract of
	garlic + green chillies	2.5 kg garlic +
	paste	2.5 kg green
		pungent
		chillies paste +
		500 g neem
		leaves + 500g
		ginger/ha
		sprayed during
		milky stage of
		rice.

Parameters	1 st	2 nd	3 rd	4 th
	year*			
Economic yield (kg/ha)	2450	2818	3560	3740
Price (Rs/kg) (25 % premium on prevailing market price)	35.0			
Cost of cultivation (Rs/ha)	48420			
Net returns (Rs/ha)	82480			

^{*}based on prices of 2013-14

Crop (Rabi): Wheat

Important features of suitable varieties

Parameters	PBW-343	PBW 373	UP 2526
Duration (days)	130 days	130 days	135 days
Average yield under	3547		
organic condition			
(kg/ha)			
Source (s) of	NSC	NSC, PAU	NSC
availability			
Suitable	Punjab, Haryana,	Western Uttar Pradesh	Western Uttar
regions/districts in the	Delhi, western UP		Pradesh
state			

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Specific resistance /	resistant to stripe	resistant to stripe rust	Loose Smut, Karnal
tolerance to disease	rust, leaf rust,	(yellow rust), leaf rust	Bunt, Stripe Rust,
	karnal bunt	(brown rust), karnal	Stem Rust, Leaf
		bunt	Rust

Field preparation: Due to short turn around period after basmati rice, the field should be immediately irrigated after rice harvest. After around 10 days when field comes in condition, the FYM should be applied and the field should be ploughed 2-3 times with disc or mouldboard plough. After ploughing, two cross tilling with times should be done each followed by planking. To ensure good germination, sowing should be done after 1-2 days of completion of field preparation.

Seed rate (kg/ha)	100				
Pre-sowing/planting treatment	Material	Recomn		Method of application	
of seed/seedlings	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		g/ha or		
		lit/ha)		T 01 D 1 11	
	Solar seed	For 2 hr	S.	For 2 hrs. During mid-	
	treatment			day after pre-soaking	
	D1	10 ~/1.~	a a a d	in water for 2 hrs. Seed treatment	
	Pseudomonas fluorescence	10 g/kg	seea	Seed treatment	
	Trichoderma	4 g/kg so	aad	Seed treatment	
	harzianum	4 g/kg s	eeu	Seed treatment	
Spacing (Row X plant) in cm	20 x 5				
Basal application of organic	Source		Quantity/	ha	
manures including soil	FYM		12 t/ha		
application of bio-fertilizers,	Azotobactor		10 kg/ha		
bio-control agents etc	PSB	10 kg/ha			
	Trichoderma		5 kg/ha		
	Neem cake		200 kg/ha	ı	
Top dressing of organic	Source	Quanti	ty/ha	Days after	
manures				sowing/planting or	
				stage of crop	
	Vermicompost	4.84 t/h		30	
	Panchagavvya	15 lit./l	na	Spray twice at 45	
Tuni gation mus ations	Number of	Most	critica	and 60 DAS	
Irrigation practices	irrigations	stages	for	1 0	
	IIIIgations	irrigation		(CIII)	
	6	Crown		t 5	
	o o	initiatio			
			g, milking		
Major weeds (give local,	Local name		h name	Scientific name	
english and scientific name)	Grasses				
	Jangali Jai	Wild o		Avena fatua	
	Gullidanda/	Littlese	eed canary	Phalaris minor	

	Baluri	grass	
	Daub ghas	Bermudagrass	Cynodon dactylon
	-	Bluegrass	Poa annua
	Broad leaf wee	Ÿ	1 000 0000000
	Jangli Berseem	1	Trifolium spp.
	Lunia	Common purslane	Portulaca oleracea
	Kateli	Creeping thistle	Circium arvense
	Bathua	Lamb's-quarters	Chenopodium album
	Hirankhuri	Field Bindweed	Convolvulus arvensis
	Peeli Senji	Yellow sweet clover	Melilotus indica
	Krishna neel	Blue Pimpernel	Anagallis arvensis
	Gajri	Fineleaf fumitory	Fumaria paviflora
	Sedges		Tumenter perrigioner
	Motha	Nut Grass	Cyprus rotundus
Weed management	Critical stag		practice for organi
	of weeding	condition	
	30 DAS	1. Hand weeding	
	45 DAS	2. Hand weeding	
		3. Stale seed bed	
		4. Higher plant st	tand
Organic plant protec		Organic mate	erial Quantity (kg
Organic plant protect practices	Name of pest/disease	Organic mate recommended	
1	pest/disease	Organic mate	erial Quantity (kg
1	pest/disease Diseases	Organic mate recommended control	for or litres/ ha)
1	pest/disease Diseases Leaf blight	Organic mate recommended control Zero tillage reduces	for Or litres/ ha)
1	pest/disease Diseases	Organic mater recommended control Zero tillage reduces survival of pathogen	for Or litres/ ha)
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil	for Or litres/ ha) the n in
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil Sowing of healthy see	the n in eeds 5kg/ha before
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment visions.	the n in eeds 5kg/ha before
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment of Pseudomonas	the n in eeds 5kg/ha before
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment visions.	the n in seeds 5kg/ha before with sowing or
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment of the process of t	the n in sowing or num
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment of the properties of the propertie	the n in sowing or num
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment of the properties of the propertie	the n in sowing or num t of At 52°C for 10
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment of the seadomonas fluorescence Trichoderma harzian Hot water treatmen seeds Soil application Pseudomonas	the n in sowing or num t of At 52°C for 10 min.
1	pest/disease Diseases Leaf blight	Organic materecommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment of the properties of the pathoger soil Sowing of healthy seand seed treatment of the properties of the pathoger soil Freudomonas fluorescence Trichoderma harzian Hot water treatment seeds Soil application Pseudomonas fluorescence	the n in sowing or num t of Skg/ha before sowing or sowing or
1	pest/disease Diseases Leaf blight	Organic mater recommended control Zero tillage reduces survival of pathoger soil Sowing of healthy see and seed treatment of Pseudomonas fluorescence Trichoderma harzian Hot water treatment seeds Soil application Pseudomonas fluorescence Trichoderma harzian fluorescence Trichoderma harzian fluorescence	the n in sowing or num t of Skg/ha before sowing or sowing or num of Skg/ha before sowing or num of Skg/ha before sowing or num
1	pest/disease Diseases Leaf blight	Organic materecommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment of the properties of the pathoger soil Sowing of healthy seand seed treatment of the properties of the pathoger soil Foliar spraying materecommended by the pathoger soil application of the pathoger soil appli	the n in sowing or num of 5kg/ha before sowing or num of 5g/L at mice.
1	pest/disease Diseases Leaf blight	Organic materecommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment of the sead seed treatment of the sead seed treatment of the sead seed treatment seeds Soil application presence Trichoderma harzian fluorescence Trichoderma harzian fluorescence Trichoderma harzian foliar spraying preudomonas	the n in sowing or num t of Skg/ha before sowing or sowing or num of Skg/ha before sowing or num of Skg/ha before sowing or num
1	pest/disease Diseases Leaf blight	Organic materecommended control Zero tillage reduces survival of pathoger soil Sowing of healthy seand seed treatment of the properties of the pathoger soil Sowing of healthy seand seed treatment of the properties of the pathoger soil Foliar spraying materecommended by the pathoger soil application of the pathoger soil appli	the n in sowing or num of Skg/ha before sowing or num of Sg/L at mic crop stage or

T _	T	
Loose smut Rusts	Solar heat treatment of seeds before storage Grow resistant varieties	soaking of seeds in water for 4 hrs followed by 8 hrs drying in clear sunny days in the month of June
Kusts	Foliar spraying of sour buttermilk	5 L buttermilk diluted in 200 L water (1000 L solution for 1ha)
Karnal bunt	Avoid excessive irrigation during ear	
	formation Foliar spraying of mustard-milk extract	1Kg mustard flour mixed in 5L milk and 100L water/ha at the time of flowering
Ear cockle or seed gall	Mechanical or physical cleaning of seeds	Dip the seeds in 20% brine solution and remove floating seed galls
	Hot water seed	At 54 ⁰ C for 10 Min.
Insect-Pests	treatment	171111.
Aphids	Spray of neem oil or neem – seed – kernel - extract	At 3% or 5% concentration, respectively, if aphid population observed
Termite	Soil application of Beauveria bassiana Application of neem leaf manure (5q/ha) or neem seed manure (1q/ha) Apply only fully	5kg/ha before sowing Before sowing

	decomposed organic	
	manures in the field	
Army worm	Foliar spray of neem	5% (5kg neem
	leaf extract	leaf crushed in
		100L boiled
		water and
		diluted to
		100L)
Rats	Flour baits mixed with	-
	cement powder	

Tield and Economics				
Parameters	1 st	2 nd	3 rd	4 th
	year*			
Economic yield (kg/ha)	2662	3125	4070	4330
Price (Rs/kg) (25 % premium on prevailing			<u> </u>	
market price)	22.5			
Cost of cultivation (Rs/ha)	44670			
Net returns (Rs/ha)	52755			

^{*}based on prices of 2013-14

Crop (summer): Sesbania green manure

Field preparation: After wheat harvest, the field should be immediately irrigated. When field comes in condition field should be prepared by two cross harrowing followed by two planking to ensure proper levelling. Sowing of Dhaincha (*Sesbania*) is done by broadcasting the seeds in field followed by irrigation.

Cultural practices

Seed rate (kg/ha)	20			
Spacing (Row X plant) in cm	Sown by broadcasting			
Irrigation practices	Number of Most critical Depth of irrig			
	irrigations stages for (cm)			
	irrigation			
	At the interval of 5			
	15 days			
Weed management	Critical stage of Recommended practice for organic			
	weeding condition			
	Not required			
Optimum stage of harvesting (in	Soil incorporation 45 days after sowing			
case of vegetables and green cob)				

Yield and Economics

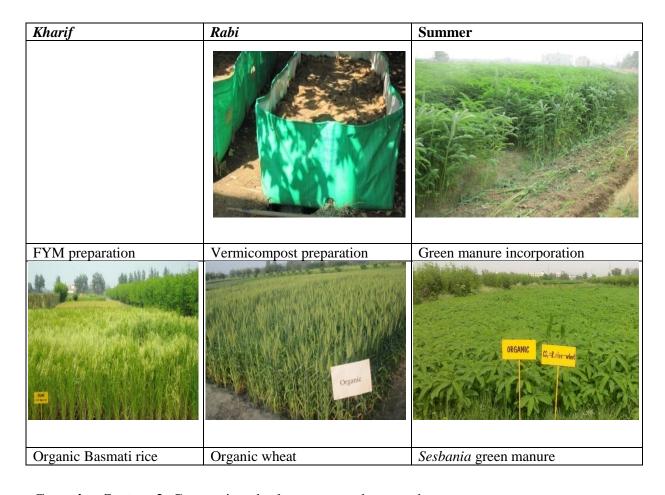
Parameters	1 st year*	2 nd
Biomass production (kg/ha) on dry weight basis	52.4	51.1
Cost of cultivation (Rs/ha)	2600	

^{*}based on prices of 2013-14

System economics

	2012-13			
Parameters	Basmati Rice	Wheat	Sesbania green manure	
Economic yield (kg/ha)	3740	4330		
Cost of cultivation (Rs/ha)	48420	44670	2600	
Total system cost of cultivation (Rs/ha)	95690			
Net returns (Rs/ha)	82480	52755		
System net returns (Rs/ha)	135235			

Glimpses



Cropping System 2: Coarse rice—barley + mustard — mungbean

Particulars		Kharif	Rabi		Summer
Crop		Coarse rice	Barley + mustard		Mungbean
Fortnight sowing/planting	of	First fortnight of July	Second fortnight of November	Second fortnight of November	Second fortnight of April
Fortnight harvesting	of	First fortnight of November	First fortnight of April	First fortnight of April	First fortnight of June

Varieties suitable	Solvat 1	Azod	Duce held	Pusa Vishal
for organic farming	Saket-4	Azad	Pusa bold	rusa visilai

Crop (kharif): Coarse rice

Important features of suitable varieties:

Parameters	Saket-4
Duration (days)	110-120 days
Average yield under organic condition (kg/ha)	3926
Suitable regions/districts in the state	Uttar Pradesh, Bihar and Jammu &
	Kashmir
Specific resistance / tolerance to pest	moderately resistant to green leaf
	hopper and stem borer
Specific resistance / tolerance to disease	moderately resistant to Bacterial
	leaf blight
Specific tolerance to drought/waterlogging	resistant to lodging

Nursery raising practices:

Nursery raising method Wet nursery
Seed sowing rate/m² 250 g (25 kg/ha)
Seed sowing rate/m² 250 g (25 kg/ha)
Seed sowing rate/m² 250 g (25 kg/ha)
Pre-sowing treatment Seed/soil treatment Materials Quantity/kg of seed or per m² area
treatment Seed or per m² application
Rea Pseudomonas 10 g/kg seed Seed treatment
Pseudomonas 10 g/kg seed Seed treatment
Fluorescence Trichodermaharzianum 4 g/kg seed
Source and optimum quantity of organic manures/other nutrient source/m² of nursery Vermicompost Trigation practices Source and optimum quantity of organic manures/other nutrient source/m² of nursery Source S
Source and quantity of quantity of manures/other nutrient source/m² of nurseryMaterials puantity of m² area applicationFYM2 kgSoil incorporationVermicompost1 kgTop dressing at 15 DASIrrigation practicesKeep saturated the soil for initial 5 days and gradually increase
manures/other source/m² of nurseryFYM Vermicompost2 kg 1 kgSoil incorporation Top dressing at 15 DASIrrigation practicesKeep saturated the soil for initial 5 days and gradually increase
manures/other source/m² of nurseryFYM Vermicompost2 kg 1 kgSoil incorporation Top dressing at 15 DASIrrigation practicesKeep saturated the soil for initial 5 days and gradually increase
source/m² of nurseryVermicompost1 kgTop dressing at 15 DASIrrigation practicesKeep saturated the soil for initial 5 days and gradually increase
source/m² of nurseryVermicompost1 kgTop dressing at 15 DASIrrigation practicesKeep saturated the soil for initial 5 days and gradually increase
Irrigation practices DAS
Weed management One hand weeding at 15 DAS
Organic plant protection Name of pest/disease Recommended Quantity/ m ² area
practices organic material
used for control
Seed borne diseases Solar seed For 2 hrs. during
treatment mid- day after
pre-soaking in
water for 2 hrs.

	Soil borne diseases	Seed treatment	Pseudomonas @
		with	10 g/kg seed &
		Pseudomonas	Trichoderma @ 4
		fluorescence &	g/kg seed
		Trichoderma	
		harzianum	
Optimum age of nursery	25 days		
(days)			

Field preparation: Firstincorporation of green manure should be done by two cross harrowing at least 20 days before transplanting. After incorporation, a heavy irrigation should be done which helps in decomposition of debris of green manure. Around 15 days after green manure incorporation, sufficient water should be applied in the field for puddling. Before puddling, about 30 cm high earthen bunds should be made around the field. Pudddle the field around 3-4 runs of puddler in standing water. After one or two days of pudling, divide the field in to narrow beds of 1.25 meter width and of any convenient length and transplanting should be done in 3-5 cm standing water.

Pre-sowing/planting	Material	Recommer	nded rate	Method of	
treatment of		(kg/ha or li	it/ha)	application	
seed/seedlings	Pseudomonas	2.5 kg/ha			
	fluorescence			Seedling treatment	
	Trichoderma	5 kg/ha			
	harzianum				
Spacing (row X plant) in cm	20 x 10				
Number of seedlings/hill	2				
Basal application of	Source		Quantity/h	ıa	
organic manures	FYM		12 t/ha	- ·	
including soil application	Azotobactor		10 kg/ha		
of bio-fertilizers, bio-	PSB		10 kg/ha		
control agents etc	Trichoderma		5 kg/ha		
	Neem cake		200 kg/ha		
Top dressing of organic	Source	Quantity/ha	Days	after	
manures			sowing	g/planting or stage	
			of crop)	
	Vermicompost	4.84 t/ha	30		
	Panchagavvya	15 lit./ha		twice at 45 and 60	
				fter transplanting	
Irrigation practices	Number of	Most critica		of irrigation (cm)	
	irrigations	stages fo	r		
		irrigation			
	10	Panicle	5	(intermittent	
		initiation,	submer	rgence)	
		flowering			
Major weeds	Local name	English name	\mathbf{S}	cientific name	
	Grasses				

	Makra ghas	Crow foot	Dactyloct	enium aegyptium	
	Takri	grass Crabgrass	Digitaria	oiliaris	
	Sewai/Sawa	Barnyardgrass		loa colona	
	Samak/Sawa	Common		loa crusgalli	
		Chinese		a chinensis	
	Jharnpriya kodu	sprangletop Indian Goose	Eleusine i		
	Kangni	grass Yellow foxtail	Setaria gl	anoa	
	Broad leaf weeds	Tellow loxtail	Seturia gi	шиси	
	Kalmua/Kalmi saag/Karemu	Morningglories	Іротоеа с	aquatica	
	Agni Booti	Blistering ammania	Ammanni	a bassifera	
	Kankaua	Dayflower	Commelin	na benghalensis	
		Water primrose	Ludwigia	spp.	
	Sedges		1		
	Motha	Rice sedge	Cyprus sp	pp.	
	Jhirua	Grass like Fimbry	Fimbristylis miliacea		
Weed management	Critical stage of we	eeding	Recommo	-	
				ic condition	
	20 days after transp		Hand weeding		
	60 days after transp	lanting	Hand weeding Continuous water		
				us water till jointing stage	
Organic plant protection	Name of	Recommende	•		
practices practices	pest/disease	material/prac	C		
	Diseases	101 001101		l	
	Seed borne diseases (Bacterial leaf blight, brown spot, blast, sheath blight) Seed treatment water Seed treatment water Seed treatment water Seed treatment water Seed treatment water		t with hot At 52 ⁰ C for 15 20 minutes		
			ng (after	Pseudomonas fluorescence 10 g/kg seed and Trichoderma spp. 10 g/kg seed	
Seedling di with P fluorescence Trichoderm			for 2 hrs udomonas and/or spp.	10g/L water	

	Before transplanting	
Soil borne diseases	1 -	5 kg/ha
Son borne diseases	Pseudomonas	J kg/IIa
	fluorescence and /or	
	Trichoderma	
	harzianum	
	Growing nursery in soil solarized seed beds	
De de de la lee		10 - /T
Bacterial lea	1 7	10g/L water
blight, sheat		(1000 L
blight and blast	fluorescence and/or	suspension/ha)
	Trichoderma spp. At	
	tillering, mid crop and	
	panicle emergence	
DI (stage.	D 1 C T
Blast	Early sowing	By end of June
		to first week of
	E-11	July
	Foliar spray of cow	10% (two sprays
	urine extract	at 10 days
		interval after
		appearance of
D	D :1	disease)
Brown spot	Provide proper nutrition	Apply
	to crop	recommended
		NPK through
01 411111	T 1' '41	organic manure
Sheath blight	Foliar spray with	10g/L water
	Pseudomonas	(1000 L
	fluorescence and/or	suspension/ha)
	Trichoderma spp. At	
	tillering, mid crop and	
	panicle emergence	
	stage. Destruction of	
	alternative weeds host	
	from border and within	
Bacterial leaf bligh	the crops t Removal of water from	
Bacteriai leai bligh		
	immediately after	
	appearance of the	
D / 1	symptoms	5 1ra/ha
Root kno	1 11	5 kg/ha
nematode	Trichoderma	
	harzianum	
	Grow nursery in soil	
-	solarized seed beds	
Insect pests	ວາ	

Г	- /1 00 11		1
	Borers/ leaf folders	Pruning of leaf tip in	
		nursery before	
		transplanting	
		Release of	50000
		Trichogramma	parasitized
		(Trichocards)- egg	eggs/ha (5-6
		parasitoid in standing	releases)
		crop based on	
		monitoring of pest	
		population through light	
		traps	
	Leaf eating	Foliar spray of Ginger-	Crush 10 kg
	caterpillars/leaf	chilli-garlic extract	garlic, 5 kg
	folders	8	ginger and 5 kg
			green chilli in 70
			L water. Apply
			extract @60L/ha
	Foliar pests	Foliar spray of cow	Spray two days
	r onwr p osts	dung-cow urine- neem	fermented extract
		leaf extract	of 2L cow urine,
		Tour Oxtract	1kg cow dung
			and 2kg crushed
			neem leaves in
			1000L water.
	Gundhi bug	Foliar application of	
	Gunani bug		2.5 kg garlic +
		garlic + green chillies	0 0
		paste	2.5 kg green
			pungent chillies
			paste + 500 g
			neem leaves +
			500g ginger/ha
			sprayed during
			milky stage of
			rice.

Parameters	1 st	2 nd	3 rd	4 th
	year*			
Economic yield (kg/ha)	3100	3875	4260	4470
Price (Rs/kg) (25 % premium on prevailing				
market price)	15.6			
Cost of cultivation (Rs/ha)	46195			
Net returns (Rs/ha)	23649			

^{*}based on prices of 2013-14

Crop (*Rabi*): Barley + mustard (4:1) Important features of suitable varieties

Parameters	Ba	Mustard	
	Azad (six row)	DWRB-91 (two row)	Pusa Bold
Duration (days)	115-120 days	115 days	140 days
Average yield under organic condition (kg/ha)	4000	3800	1000
Source (s) of availability	CSA, University of Agriculture & Technology, Kanpur (UP)	DWR Karnal	IARI, New Delhi
Suitable regions/districts in the state	saline-alkaline soils of UP, Bihar and West Bengal		All India

Field preparation: Due to short turn around period after rice, the field should be immediately irrigated after rice harvest. After around 10 days when field comes in condition, the FYM should be applied and the field should be ploughed 2-3 times with disc or mouldboard plough. After ploughing, two cross tilling with tines and 2-3 planking should be done. To ensure good germination, sowing should be done after 1-2 days of completion of field preparation.

Seed rate (kg/ha)	80					
Pre-sowing/planting treatment	Material Recommended			Method of application		
of seed/seedlings		rate (kg/ha or				
		lit/ha)				
	Solar seed	For 2 hrs	S.	For 2 hrs. during mid-		
	treatment			day after pre-soaking		
				in water for 2 hrs.		
	Pseudomonas	10 g/kg	seed	Seed treatment		
	fluorescence					
	Trichoderma	4 g/kg se	eed	Seed treatment		
	harzianum					
Spacing (Row X plant) in cm	20 x 5		ı			
Basal application of organic	Source		Quantity/	⁄ha		
manures including soil	FYM		8 t/ha			
application of bio-fertilizers,	Azotobactor		10 kg/ha			
bio-control agents etc	PSB		10 kg/ha			
	Trichoderma		5 kg/ha			
	Neem cake		200 kg/ha			
Top dressing of organic	Source	Quantit	ty/ha	Days after		
manures				sowing/planting or		
				stage of crop		
	Vermicompost			30		
	Panchagavvya	15 lit./h	na	Spray twice at 45 and		
				60 DAS		
Irrigation practices	Number of		critical	Depth of irrigation		
	irrigations	stages	for	(cm)		
		irrigatio	on			

			4	Active tiller	ing.)	
				flowering			
Major weeds		Loc	cal name	English nan	<u></u>	Scientific name	
J		Gras		8			
			ali Jai	Wild oat		Avena fatua	
			danda/	Littleseed ca	nary		
		Baluri		grass	3	Phalaris minor	
		Daub	ghas	Bermudagra	SS	Cynodon dactylon	
				Bluegrass		Poa annua	
		Broa	d leaf weed				
		Jangl	li Berseem	Wild colver		Trifolium spp.	
		Lunia	a	Common pu	rslane	Portulaca oleracea	
		Katel	li	Creeping thi	stle	Circium arvense	
		Bath	ua	Lamb's-quar	ters	Chenopodium album	
		Hirar	nkhuri	Field Bindw	eed	Convolvulus arvensis	
		Peeli	Senji	Yellow swee	t	Melilotus indica	
		Krish	nna neel	Blue Pimper	nel	Anagallis arvensis	
				Fineleaf fumitory		Fumaria paviflora	
		Sedg	es				
		Motha		Nut Grass		Cyprus rotundus	
Weed management		Critic		_		ractice for organic	
		of we	eeding	condition			
				Hand weeding			
			T	Hand weeding			
Organic plant	Name	of	Organic	material	Quan	tity (kg or litres/ ha)	
protection practices	pest/dise	ease	recomme	nded for			
	D'		control				
	Diseases		IIf				
	Covered			ertified seeds			
	of barley		and resistant variety Crop rotation		-		
				treatment of At 52		At 52 ^o C for 11 Min.	
			seeds before				
	Rusts		Grow	resistant			
	114565		varieties o				
				aying of sour	5 L d	iluted in 200L water	
			buttermilk	• •		L solution for 1ha)	
				rtified seeds	`	,	
	Stripe di	sease	030 01 00				
	Stripe di	sease		ant variety			
	Stripe di	sease		•			
	Stripe di	sease	and resista Crop rotat	•	At 52	⁰ C for 11Min.	
	Stripe di	sease	and resista Crop rotat Hot water	ion	At 52	⁰ C for 11Min.	
	Insect-P		and resista Crop rotat Hot water seeds befo	ion treatment of ore sowing			
	-		and resista Crop rotat Hot water seeds befo	treatment of ore sowing		⁰ C for 11Min.	

	Application of neem leaf manure (5q/ha) or neem seed manure (1q/ha)	Before sowing
	Apply only fully decomposed organic manures in the field	
Army worm	Foliar spray of neem leaf extract	5% (5kg neem leaf crushed in 100L boiled water and diluted to 100L)
Rats	Flour baits mixed with cement powder	

Parameters	1 st year*	2 nd
Economic yield (kg/ha) Barley + Mustard	2560+ 385	2830+ 334
Price (Rs/kg) (25% premium on prevailing	14.4 + 37.5	
market price)		
Cost of cultivation (Rs/ha)	33860	
Net returns (Rs/ha)	36009	

^{*}based on prices of 2013-14

Crop (Summer): Green gram

Important features of suitable varieties

Parameters	Pusa Vishal	Pant Moong-1	Pant Moong-2	
Duration (days)	65-70	65-75 days	60-65	
Average yield under	735			
organic condition				
(kg/ha)				
Source (s) of	IARI, New Delhi			
availability				
Suitable	Punjab, Haryana,			
regions/districts in the	Western UP,			
state	Rajasthan, J&K			
	and Plains of			
	Himanchal			
	Pradesh			
Specific resistance /	tolerant to jassids			
tolerance to pest	and whitefly			
Specific resistance /	resistant to yellow	Resistant to yellow	Resistant to yellow	
tolerance to disease	vein mosaic	mosaic virus	mosaic virus	
Specific tolerance to		resistant to shattering		
drought / waterlogging				

Field preparation: For summer season, a pre-irrigation immediately after harvesting of Rabi crop should be given. When the field comes in condition, prepare it by giving 2-3 cross harrowing followed by planking to make the field levelled.

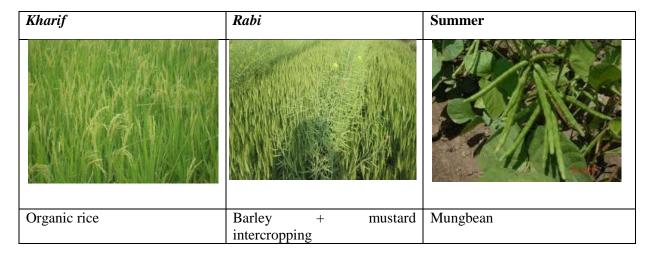
Seed rate (kg/ha)	15				
Pre-sowing/planting treatment	Material	Recommend	ed	Method of application	
of seed/seedlings	rate (kg/ha or		11		
	lit/ha)				
	Rhizobium	25 g/ Kg See	ed	Seed treatment	
	Pseudomonas	10 g/kg seed		Seed treatment	
	fluorescence				
	Trichoderma	4 g/kg seed		Seed treatment	
	harzianum				
Spacing (Row X plant) in cm	30 x 10				
Basal application of organic	Source	Qu	antity/	'ha	
manures including soil	FYM	4 t/	/ha		
application of bio-fertilizers,	Rhizobium		kg/ha		
bio-control agents etc	PSB	10	kg/ha		
	Trichoderma		g/ha		
Top dressing of organic	Source	Quantity/ha	l	Days after	
manures				sowing/planting or	
				stage of crop	
	Vermicompost			30	
Irrigation practices	Number of		ritical	Depth of irrigation	
	irrigations	stages	for	(cm)	
		irrigation			
	3	\mathcal{E}		5	
76		pod formati		G	
Major weeds	Local name	English na		Scientific name	
	Daubghas	Bermooda g	grass	Cynodon dactylon	
	Motha	Nut grass		Cyprus rotundus	
	Patharchatta	Horse pursl	ane	Trianthema	
Wood management	Critical stage	Recommen	dad :	portulacastrum	
Weed management	Critical stage of weeding	condition	iaea	practice for organic	
	25 DAS	Hand weed	ina		
Organic plant protection	Name of		mg	Quantity (kg or	
practices plant protection	pest/disease	material		litres/ ha)	
practices	pestruisease	recommend	ded	ntres/ na)	
		for control			
	Diseases	101 control			
	Yellow	Control	of	At 3% or 5%	
	mosaic	whitefly ve		concentration,	
	disease	by spray of i		respectively if,	
		oil or neem-		whitefly population	
		kernel-extrac	et	observed	
	Leaf eating	Spray of nee	m oil	At 3% or 5%	
	insects	or neem-		concentration,	
		kernel-extrac	et	respectively, if, leaf	
				damage observed	

Parameters	1 st	2 nd	3 rd	4 th
	year*			
Economic yield (kg/ha)	976	208	871	886
Price (Rs/kg) (25 % premium on prevailing market price)	50.0			
Cost of cultivation (Rs/ha)	17790			
Net returns (Rs/ha)	26510			

System economics

Parameters	2012-13				
	Rice Barley + mustard Green gra				
Economic yield (kg/ha)	4470	3830+395	886		
Cost of cultivation (Rs/ha)	46195	32280+1580	17790		
Total system cost of cultivation (Rs/ha)	97845				
Net returns (Rs/ha)	23649	22776+13233	26510		
System net returns (Rs/ha)	86168				

Glimpses



$Cropping\ System\ 3: Maize\ (grain)-potato-okra$

Particulars	Kharif	Rabi	Summer
Crop	Maize	Potato	Okra
Fortnight of	First fortnight of	Second fortnight	First fortnight of
sowing/planting	July	of October	March
Contribbt of homyosting	First fortnight of	First fortnight of	Second fortnight of
Fortnight of harvesting	October	March	June
Varieties suitable for organic farming	Star-56	Chipsona-3	Arka Anamika

Crop (kharif): Maize

Important features of suitable varieties:

Parameters	Star-56	PMH-3	PMH-4	
Duration (days)	90-95 days	95 -100 days		
Average yield under organic condition (kg/ha)	7380	6200	6000	
Source (s) of availability	Private sector variety	DRMR, New Delhi	DRMR, New Delhi	
Suitable regions/districts in the state	North Western India	Delhi, Punjab, Haryana and Western UP	Delhi, Punjab, Haryana, Uttar Pradesh and Uttrakhand	
Specific resistance / tolerance to pest		Resistance to Maydis		
Specific resistance / tolerance to disease		Resistance to leaf blight, erwinia stalk rot	Resistant against MLB, BLSB, BSDM and PFSR	

Field preparation: The first ploughing should be done by 2-3 cross harrowing for the proper incorporation of okra debris in to soil. Then the field should be irrigated for proper decomposition of okra debris and ensuring proper moisture for maize germination. When the field comes in condition, 2 cross harrowing followed by two cross tilling with cultivators or should be done. After that 1-2 planking should be done to ensure proper levelling. For sowing maize broad beds of 60 cm width should be made with the help of soil shaper.

Seed rate (kg/ha)	20				
Pre-sowing/planting	Material	Recommended	M	ethod of application	
treatment of		rate (kg/ha	or		
seed/seedlings		lit/ha)			
	Pseudomonas	10 g/kg seed	Se	ed treatment	
	fluorescence				
	Trichoderma	4 g/kg seed			
	harzianum				
Spacing (Row X plant)	60 x 20				
in cm					
Basal application of	Sou	rce		Quantity/ha	
organic manures	FYM		10 t/ha		
including soil	Azotobactor		10 kg/l	na	
application of bio-	PSB		10 kg/l	na	
fertilizers, bio-control	Trichoderma		5 kg/ha	a	
agents etc	Neem cake		200 kg	/ha	
Top dressing of organic	Source	Quantity	/ha	Days a	fter

manures							sowing/planting	
							or stage of crop	
		Vermicom	_		4.0 t/ha		30	
		Panchagav	vya		15 lit./ha		Spray twice at 45	
Turi coti on muonti con		NII		- C	M4:4:1	4	and 60 DAS	
Irrigation practices		Number	7	of	Most critical s for irrigation	tages	Depth of	
		irrigations	3		Silking, tasselin	ισ	irrigation (cm)	
Major weeds		Local n	_	En	glish name	Scientific name		
3		Grasses		1	<u> </u>			
				Cr	ow foot grass	Dac	ctyloctenium	
		Makra gha	S				yptium	
		Sewai/Saw	'a	Ba	rnyard grass		inochloa colonum	
		Samak/Sav	wa		mmon barnyard	Ech	inochloa crusgali	
				gra		Dia	itania oiliania	
		Takri			abgrass		itaria ciliaris odon dactylon	
		Doobghas		1	rmuda grass		•	
			Banchari Johnson grass			Sor	ghum helepanse	
		Broad leaf weeds Baridhudi Hairy spurge			Euphorbia hirta			
		Chouli		, , , ,		Amaranthus viridis		
		Choun		Pig weed		Trianthima		
		Pattharcha	chatta H		orse purslane	portulacastrum		
		Lalmurga		Co	ckscomb,	Celosia argentia		
		Kankoua		Da	Dayflower		Commelina benghalensis	
		Hulhul/Chilmil		Hu	Hurricane weed		Phylanthus niruri	
		Makoi		Bla	Black nightshade		Solanum nigrum	
		Lunia		Pu	rslane	Portulaca oleraceae		
		Sedges		1				
		Motha		Pu	rple nutsedge	Сур	rus rotundus	
Weed management	t	Critical weeding	stage	of	Recommended condition	pra	ctice for organic	
		30 DAS			Hand weeding			
	50 DAS				Hand weeding			
		002110			Stale seed bed			
Organic plant		ne of pest	Organ		material	_	ntity (kg or litres/	
protection	/dise		recomi	men	ded for control	ha)		
practices		eases	G 10		111	-		
	Soil	borne		z see	edling treatment		domonas @ 10 g/kg	
	disea	ases	with	0012	Pseudomonas		&Trichoderma @ 4	
			fluores		ence & g/kş erma harzianum		Seed	
	Leaf	•	• Crop					
	Loui	-	- Crop	1014	uon			

spot/blight	 Deep summer ploughing 	
	 Clean cultivation 	
Rust	Foliar spraying of sour	5 L diluted in 200L
	buttermilk	water (1000 L solution
		for 1ha)
Banded leaf	Foliar spraying of	Two sprays at 10 days
and sheath	Pseudomonas fluorescence	interval after appearance
blight	and/ or <i>Trichoderma</i>	of symptoms @5g/L
	harzianum	water
Insect-Pests		
1. Maize Stem	Release of	Tricho-cards @ 1 lakh
borer	Tricogramma chilonis	parasitized eggs/ha at 10
	(Tricho-cards)	days intervals 5-6 times

Parameters	1 st year*	2 nd	3 rd
Economic yield (kg/ha)	4380	4860	4590
Price (Rs/kg) (25 % premium on prevailing			
market price)	18.8		
Cost of cultivation (Rs/ha)	40425		
Net returns (Rs/ha)	54075		

^{*}based on prices of 2013-14

Crop (Rabi): Potato Important features of suitable varieties

Parameters	Mid dı	ıration	Early			
	Chipsona-	Chipsona-	Kufri Pukhraj	Kufri	Kufri	
	2	3		Ashoka	Chandramukhi	
Duration (days)	90-110		70-90	70-80	80-90	
Average yield		32400				
under organic						
condition						
(kg/ha)						
Source (s) of	CPRI	CPRI	CPRI	CPRI	CPRI	
availability						
Suitable	North	North	Bihar, Gujarat,		Bihar, Gujarat,	
regions/districts	Indian	Indian	Haryana,		Haryana,	
in the state	plains	plains	Himachal		Himachal	
			Pradesh, Uttar		Pradesh, Uttar	
			Pradesh,		Pradesh, Punjab,	
			Punjab, West		West Bengal	
			Bengal			
Specific	Resistant	Resistant	Resistant to	Tolerant to	Tolerant to many	
resistance /	to late	to late	early blight and	late blight	diseases	
tolerance to	blight,	blight	moderately			
disease	immune		resistant to late			
	to wart		blight			

Field preparation: To ensure fine and well pulverized seed bed for potato, field should be ploughed twice 20-25 cm deep with disc plough followed by two cross harrowing. After harrowing, the field should be cross tilled twice with tine cultivator each followed by planking. After field preparation, ridges are made in the field 60 cm apart with the help of ridger.

Seed rate (kg/ha)	2500				
Pre-sowing/planting treatment	Material	Recommended		Method of	application
of seed/seedlings		rate (kg/ha or lit/ha)			
	Solar seed	For 2 hr	S.	For 2 hrs.	during mid-
	treatment			day after pre-soaking in	
				water for 2	hrs.
	Pseudomonas	10 g/kg	seed	Seed treatr	nent
	fluorescence				
	Trichoderma	4 g/kg so	eed	Seed treatr	nent
	harzianum				
Spacing (Row X plant) in cm	60 x 20				
Basal application of organic	Source		Quantity/	ha	
manures including soil			15 t/ha		
application of bio-fertilizers, bio-control agents etc	Azotobactor		10 kg/ha		
bio-control agents etc	PSB Trichoderma		10 kg/ha		
	Neem cake		5 kg/ha 200 kg/ha	2	
Top dressing of organic	Source	Quanti		Days after	
manures	Source	Quanti	ty/11a	sowing/planting or	
				stage of crop	
	Vermicompost	6.0 t/ha	ì	30	
	Panchagavvya	15 lit./l	na	Spray twice at 45 and	
	-			60 DAS	
Irrigation practices	Number of		critical	Depth o	f irrigation
	irrigations	stages	for	(cm)	
		irrigati			
	8		initiation	5	
		to	tuber		
Major weeds	Local name	maturit Engl	ish name	Scient	ific name
Wilder Weeds	Grasses	Lingi		Belefit	THE HUITE
	Jangali Jai	Wild	nat	Avena	fatua
	Gullidanda/ Littleseed car			v	
	Baluri			' Phalar	is minor
			nudagrass	Cynode	on dactylon
	Poa ghas	Blue		Poa an	
	Broad leaf wee				
	Jangli Berseem	Wild	colver	Trifolii	um spp.

	-		teli hua ankhuri	pursla Canac Lamb Field	Common purslane Canada Thistle Lambsquarters Field Bindwe		Portulaca of Circium arv Chenopodiu album Convolvulus arvensis Melilotus in	ense m
		Du	<u> </u>	Sowth			Sonchus spp	
		Jan	gali palak		lleaf docl	ζ	Rumex obtus	
			lges	•				
		Mo	tha	Nut C	Grass		Cyprus rotui	ndus
Weed management			itical stage		mended	pra	actice for	organic
			weeding	conditi				
			DAS	Hand w				
Ongonia -la4	Name		DAS Organic	Hand w	eeding naterial	0	antity (1-~	n lituaa/
Organic plant protection	pest/diseas	of	recommend			Qu ha)	antity (kg o	r nures/
protection	Diseases		recomment	<u> </u>		na)	'	
practices	Early blight Late blight	• Use of health • Crop rotation • Provide proposed to plant • Removal and infested plant • Deep summe • Avoid irrigate cloudy weath • Foliar sprate Pseudomonal fluorescence subtilis		and bur blant debrace and cather spraying onas and cather land	on trition raing of ris age in cool of Bacillus rties in the	5g/sol	L water ution/ha)	(1000L
		urf em	Pseudomona & Trichode Mulching of	treatments of soil w (2-3cm)	rescence ianum of rescence ianum	g/k & <i>T</i> g/k 5 pre	<i>Trichoderma</i> g seed	@ 10tuber@ 400 kgwellM

	T =	T	
	Virus	Use virus free healthy seeds	
	diseases	Rouging of infected plants	
		Control of aphid vectors by	At 3% or 5%
		foliar application of neem	concentration,
		oil or neem-seed- kernel-	respectively if, aphid
		extract	population observed
		Dehaulming at-least 15days	
		before harvesting	
	Insect-Pests		
	Aphids	Foliar application of neem	At 3% or 5%
		oil or neem-seed- kernel-	concentration,
		extract	respectively, if aphid
			populations observed
	Cutworms	Use of light traps	
		Soil application of	5kg/ha
		Beauveria bassiana before	
		sowing	
	White grubs	• Deep summer ploughing	
		• Install light traps in April-	
		May	51ra/ha mmaaalanigad in
		•Soil application of	5kg/ha precolonized in 100kg FYM
		Beauveria bassiana before	TOOKE FIM
		sowing or Metarrhizium	
	4.Nematodes	<i>anisoplae</i> Soil application of	10kg/ha propological in
	4.Nematodes	Soil application of Pseudomonas fluorescence	10kg/ha precolozized in well rotten FYM
		and/ or Trichoderma	WEII TOUGH F I WI
		harzianum	
Optimum stage of	Potato should	be harvested when haulms star	t vellowing an falling on
harvesting		he digging of tubers should	• •
inai vosting	cuttingthe haul	66 6	or done to days after
	1 January Hadi		

Parameters	1 st	2 nd	3 rd	4 th
	year*			
Economic yield (kg/ha)	9430	12083	21300	22300
Price (Rs/kg) (25 % premium on prevailing				
market price)	10.0			
Cost of cultivation*(Rs/ha)	114238			
Net returns* (Rs/ha)	108763			

^{*}based on prices of 2013-14

Crop (summer): Okra

Important features of suitable varieties

Parameters	Arka Anamika
Duration (days)	130-135 days

Average yield under organic condition (kg/ha)	10405
Source (s) of availability	IIHR, Banglore
Specific resistance / tolerance to disease	Yellow vein mosaic resistant

Field preparation: In the loose field left after potato digging, FYM should be applied. After that a pre-irrigation should be given after ensuring levelling by cross tilling with tine cultivator followed by planking. When the field comes in condition, field should be cross-harrowed once followed by one cross-tilling with tine cultivator and planking. For sowing, ridges are to be made in the field 60 cm apart with the help of ridger.

Seed rate (kg/ha)	18					
Pre-sowing/planting	Material			Method of application		
treatment of		(kg/ha or lit/ha)				
seed/seedlings	Solar seed			For 2 hrs. during mid-		
	treatment			day after pre-soaking in		
		v		water for 2 hrs.		
	Pseudomonas	10 g/kg se	ed	Seed treatment		
	fluorescence					
	Trichoderma	4 g/kg see	ed	Seed treatment		
	harzianum					
Spacing (Row X	45 x 30					
plant) in cm						
Basal application of			Quantity/ha			
organic manures	FYM		12 t/ha			
including soil	Rhizobium		10 kg/ha			
application of bio-	PSB 10 kg/ha					
fertilizers, bio-	Trichoderma 5 kg/ha					
control agents etc						
	Neem cake 200 kg/ha					
Top dressing of	Source Quantity/ha		Quantity/ha	Days after		
organic manures				sowing/planting or		
				stage of crop		
	Vermicompost		4.83 t/ha	30		
Irrigation practices	Number of irrig	gations	Most critic			
			0	for (cm)		
	irrigation					
			Pod formation	5		
Major weeds	Local name		English name	Scientific name		
	Grasses					
	Malana ahas		Crow foot gras	s Dactyloctenium		
	Makra ghas			aegyptium		
	Doobghas		Barmuda grass	Cynodon dactylon		

	Broad leaf w	veeds				
	Pattharchatta		Н	forse purslane	Trianthima portulacastrum	
	Makoi		Bl	ack nightshade	Solanum nigrum	
	Sedges					
	Motha			Nut Grass	Cyprus rotundus	
Weed management	Critical stag			d practice for organic		
	20 D A C			condition		
	20 DAS 40 DAS			Hand weeding Hand weeding		
	60 DAS			Hand weeding		
Organic plant	Name of	Organic		material	Quantity (kg or litres/	
protection practices	pest/diseas	recommend	ed		ha)	
	e				,	
	Diseases					
	Cercospora	• Grow resi	staı	nt varieties		
	leaf spot	 Crop rotat 				
		• Collection and destruction of infected crop debris				
	Fusarial			-		
	wilt	• Long crop		r ploughing		
	WIII	Soil solari				
				lication of		
				s fluorescence	5kg/ha in 100kg	
				na harzianum	precolonized well	
	Davidani	C 1 4	•,•	. 1 .	decomposed FYM	
	Powdery mildew	• Good nutr		-		
	iiiide w	to crop	Ш	kler irrigation		
		-	avi	ng of neem oil	At 3% or 5%	
				eed- kernel-	concentration,	
		extract			respectively	
	Yellow	• Grow resis				
	vein mosaic			wide spaced		
				der/intercrop		
		0 0		destruction of		
		 infected plants Control of whitefly vectors through foliar spraying of neem oil or neem-seed- 			At 3% or 5%	
					concentration,	
					respectively If,	
		kernel-extr	act		whitefly population	
	Doo4 1	- 0 '1 1 '		•	observed	
	Root knot nematode	• Soil solari				
	nemaioue	• Crop rot host crop	auC	on with non-		
		-	เทท	lication of	5kg/ha in 100kg	
				harzianum	precolonized well	
					decomposed FYM	

	T 4		
	Insect-pests		
	Jassids	 Grow okra in wide spaced rows or as border/intercrop Foliar spraying of neem oil or neem- seed- kernel-extract 	At 3% or 5% concentration, respectively if jassid populations observed
	Fruit borer	Foliar spraying of neem oil or neem-seed- kernel-extract	At 3% or 5% concentration, respectively
	Red spider mite	 Give sprinkler irrigation Foliar spraying of neem oil or neemseed-kernel-extract 	At 3% or 5% concentration,respectively
Optimum stage of harvesting	Multiple pickir	ngs of fully grown tender po	ds

Parameters	1 st	2 nd	3 rd	4 th
	year*			
Economic yield (kg/ha)	4551	1558	10280	10530
Price (Rs/kg) (25 % premium on prevailing market price)	22.5			
Cost of cultivation**(Rs/ha)	61070			
Net returns** (Rs/ha)	175855	5		

^{*}based on prices of 2013-14

System Economics

		2012-13				
Parameters	Maize (grain)	Potato	Okra			
Economic yield (kg/ha)	5040	22300	10530			
Cost of cultivation (Rs/ha)	40425	114238	61070			
Total system cost of cultivation (Rs/ha)	215733					
Net returns (Rs/ha)	54075	108763	175855			
System net returns (Rs/ha)	338693					

Glimpses

-

photo of inputs	Pseudomonas fluoresence Vrichodermo harzianum	photo of inputs
title	Disease management of potato through bioagents	title
	CS3 100% OF SAULC	photo of crop
Organic maize	Organic potato var. Chiopsona- 3	title
Organic maize cobs	Organic potato var. Chiopsona- 3	Okra var. Arka Anamika

Cropping System 4.Maize (green cobs) – mustard + radish - Sesbania green manure

Particulars	Kharif	Rabi		Summer
Crop	Maize (green	Mustard + Radish		Sesbania green
Стор	cobs)			manure
Fortnight of	First fortnight	Second	Second	Second fortnight
sowing/planting		fortnight of	fortnight of	of April
sowing/planting	of July	October	October	
Fortnight of	First fortnight	First fortnight	First fortnight	Incorporation in
harvesting	of October	of March	of March	soil after 45 DAS
Varieties suitable	Star-56	Pusa Bold	Ivony vyhita	
for organic farming	Stat-30	rusa Dolu	Ivory white	

Crop (kharif): Maize (sweet corn) **Important features of suitable varieties:**

Parameters	Madhuri
Duration (days)	
Average yield under organic condition (kg/ha)	10000
Source (s) of availability	ANGRAU, Hyderabad
Suitable regions/districts in the state	Andhra Pradesh and other maize
	growing regions

Field preparation: The first ploughing should be done by 2-3 cross harrowing for the proper incorporation of okra debris in to soil. Then the field should be irrigated for proper decomposition of okra debris and ensuring proper moisture for maize germination. When the field comes in condition, 2 cross harrowing followed by two cross tilling with cultivators or should be done. After that 1-2 planking should be done to ensure proper levelling. For sowing maize broad beds of 60 cm width should be made with the help of soil shaper.

Seed rate (kg/ha) (Not applicable for nursery crops)	20					
Pre-sowing/planting	Material	Recomme	ended rate	Method of		
treatment of seed/seedlings		(kg/ha or	lit/ha)	application		
-	Pseudomonas	10 g/kg se	eed	Seed treatment		
	fluorescence					
	Trichoderma	4 g/kg see	ed			
	harzianum					
Spacing (Row X plant) in	60 x 20					
cm						
Basal application of organic	Source	e		Quantity/ha		
manures including soil	FYM		10 t/ha			
application of bio-	Azotobactor		10 kg/ha			
fertilizers, bio-control	PSB 10 kg/ha					
agents etc	Trichoderma 5		5 kg/ha			
	Neem cake		200 kg/ha			
Top dressing of organic	Source Quantity		ty/ha	Days after		
manures				sowing/planting		
				or stage of crop		
	Vermicompost	4.0 t/ha		30		
	Panchagavvya	15 lit./h	ıa	Spray twice at 45 and 60 DAS		
Irrigation practices	Number	of Most	critical	Depth of		
	irrigations	stages	for	irrigation (cm)		
		irrigati				
	3 Silking, tasseling			5		
Major weeds	Local name English name		Scientific name			
	Grasses					
	I Makra onac		_	ctyloctenium yptium		
	Sewai/Sawa	Barnyard g	rass <i>Ech</i>	inochloa colonum		
	Samak/Sawa	Common	Ech	inochloa crusgali		

				baı	rnyard grass		
		Takri			abgrass	Digitaria ciliaris	
		Doobg	has	_	rmuda grass	Cynodon dactylon	
		Bancha			nnson grass	Sorghum helepanse	
	Broad leaf weeds						
		Baridh			iry spurge	Euphorbia hirta	
		Chouli			g weed	Amaranthus viridis	
		Pattharch			orse purslane	Trianthima portulacastrum	
		Lalmu	rga	Co	ckscomb,	Celosia argentia	
		Kanko		Da	yflower	Commelina benghalensis	
		Hulhul	/Chilmil	Hu	rricane weed	Phylanthus niruri	
		Makoi			ack nightshade	Solanum nigrum	
		Lunia		Pu	rslane	Portulaca oleraceae	
		Sedges	5				
		Motha		Pu	rple nutsedge	Cyprus rotundus	
Weed managemen	ıt	Critica weedin		of	Recommended condition	l practice for organic	
		30 DA			Hand weeding		
		50 DA	C		Hand weeding		
		30 DA		Stale seed bed			
Oversia plant Name of most					State seed bed		
Organic plant	Name o	f pest	Organic			Ouantity (kg or litres/	
Organic plant protection	Name o	f pest	Organic		material	Quantity (kg or litres/ha)	
Organic plant protection practices		f pest	_		material	Quantity (kg or litres/ha)	
protection		•	recomm		material		
protection	/disease	•	recomm control	end	material led for		
protection	/disease Diseases		recomm control	end	material led for	ha)	
protection	/diseases Soil		recomm control Seed & with fluoresco	seed	material for ling treatment Pseudomonas &	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg	
protection	/diseases Soil diseases		Seed & with fluoresce Trichode	seed ence	material for ling treatment Pseudomonas & a harzianum	Pseudomonas @ 10 g/kg seed &	
protection	/diseases Diseases Soil diseases Leaf	borne	recomm control Seed & with fluoresco Trichode • Crop re	seed	material for ling treatment Pseudomonas & & a harzianum	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg	
protection	/diseases Soil diseases	borne	Seed & with fluorescore Trichodo	seed ence	material ded for definition mer ploughing	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg	
protection	/diseases Diseases Soil diseases Leaf	borne	Seed & with fluoresce Trichode • Crop re • Deep se	seed ence erma otati	material for ling treatment a harzianum lion mer ploughing livation	ha) Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg seed	
protection	/diseases Diseases Soil diseases Leaf	borne	Seed & with fluoresce Trichode • Crop re • Deep se	seed ence erma otati sumi culti	material ded for definition mer ploughing	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg	
protection	/disease Diseases Soil diseases Leaf spot/bligh	borne	Seed & with fluoresce Trichode • Crop re • Deep se • Clean e Foliar se buttermi	seed ence erma otati sumi culti spra	material for ling treatment a harzianum fon mer ploughing fivation for ying of sour	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg seed 5 L diluted in 200L water (1000 L solution for 1ha)	
protection	/diseases Soil diseases Leaf spot/blight Rust	borne	Seed & with fluoresce Trichode Crop re Deep seed Clean end of the control of the	seed seed seed seed seed seed seed seed	material for line for	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg seed 5 L diluted in 200L water	
protection	/disease Diseases Soil diseases Leaf spot/blight Rust Banded	borne	Seed & with fluoresce Trichode • Crop re • Deep se • Clean es buttermine	seed enceeermootatii suuni cultii sprajilk sijannonoo	material for line for	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg seed 5 L diluted in 200L water (1000 L solution for 1ha) Two sprays at 10 days	
protection	/disease Diseases Soil diseases Leaf spot/bligh Rust Banded and	borne	seed & with fluoresce Trichode • Crop re • Deep se • Clean es buttermi Foliar Pseudon fluoresce fluoresce fluoresce for the control of the	seed eence eerma cotati	material for line for	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg seed 5 L diluted in 200L water (1000 L solution for 1ha) Two sprays at 10 days interval after appearance	
protection	/disease Diseases Soil diseases Leaf spot/bligh Rust Banded and	borne ht leaf sheath	seed & with fluoresce Trichode • Crop re • Deep se • Clean es buttermi Foliar Pseudon fluoresce fluoresce fluoresce for the control of the	seed eence eerma cotati	material for line treatment Pseudomonas & & a harzianum ion mer ploughing ivation ying of sour praying of as and/ or	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg seed 5 L diluted in 200L water (1000 L solution for 1ha) Two sprays at 10 days interval after appearance of symptoms @5g/L	
protection	/disease Diseases Soil diseases Leaf spot/blight Rust Banded and blight	borne ht leaf sheath	seed & with fluoresce Trichode • Crop re • Deep se • Clean es buttermi Foliar Pseudon fluoresce fluoresce fluoresce for the control of the	seed eence eerma cotati	material for line treatment Pseudomonas & & a harzianum ion mer ploughing ivation ying of sour praying of as and/ or	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg seed 5 L diluted in 200L water (1000 L solution for 1ha) Two sprays at 10 days interval after appearance of symptoms @5g/L	
protection	Insect-Po	borne ht leaf sheath	recomme control Seed & with fluoresce Trichode Crop results buttermi Foliar Pseudom fluoresce Trichode Release Tricografic	seed ence erma summer substitution of amministration of the seed o	material for ling treatment Pseudomonas & & a harzianum ion mer ploughing ivation ying of sour praying of as and/ or a harzianum	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg seed 5 L diluted in 200L water (1000 L solution for 1ha) Two sprays at 10 days interval after appearance of symptoms @5g/L water Tricho-cards @ 1 lakh parasitized eggs/ha at 10	
protection	Diseases Soil diseases Leaf spot/blight Rust Banded and blight Insect-Petron Maize borer	borne ht leaf sheath ests e Stem	recomme control Seed & with fluoresce Trichode Crop re Deep se Clean of C	seed seed seed seed seed seed seed seed	material for line for	Pseudomonas @ 10 g/kg seed & Trichoderma @ 4 g/kg seed 5 L diluted in 200L water (1000 L solution for 1ha) Two sprays at 10 days interval after appearance of symptoms @5g/L water Tricho-cards @ 1 lakh	

Parameters	1 st	2 nd	3 rd
------------	-----------------	-----------------	-----------------

	year*		
Economic yield (kg/ha)	9160	9060	8860
Price (Rs/kg) (25 % premium on prevailing market			
price)	12.5		
Cost of cultivation**(Rs/ha)	40425		
Net returns** (Rs/ha)	74825		

^{*}based on prices of 2013-14

Crop (*Rabi*): Mustard + radish (1:2) **Important features of suitable varieties**

Parameters		Radish		
	Pusa Bold	RH- 406	RGN- 229	Ivory white
Duration (days)	140 days			
Average yield under organic condition (kg/ha)	1000	2000	1950	14410
Source (s) of availability			SKRAU, Bikaner	
Suitable regions/districts in the state	All India	Delhi, Haryana, J & K, Punjab and parts of Rajasthan	Delhi, Haryana, J & K, Punjab and parts of Rajasthan	
Specific tolerance to drought / waterlogging		Lodging resistant	Tolerant to lodging, shattering, high temperature & salinity	

Field preparation: To ensure a clean and well pulverised seedbed for mustard, the land should be well prepared first by ploughing deep with soil turning plough, followed by two cross harrowing. Each harrowing should be followed by planking for ensuring proper levelling. After field preparation, ridges are made in the field 60 cm apart with the help of ridger. While sowing the mustard seed should be shown on the top and the radish can be sown on both the sides of rides.

Cultural practices			
Seed rate (kg/ha)	Mustard- 4 kg,	Radish- 10 kg	
Pre-sowing/planting treatment of	Material	Recommended	Method of
seed/seedlings		rate (kg/ha or	application
		lit/ha)	
	Pseudomonas	10 g/kg seed	Seed treatment
	fluorescence		
	Trichoderma	4 g/kg seed	Seed treatment
	harzianum		
Spacing (Row X plant) in cm	45 x 10		
Basal application of organic	Source	Quantity/	ha
manures including soil	FYM	12 t/ha	

application of bio-fertilizers, bio-	Azotobactor		10 kg/ha		
control agents etc	PSB		10 kg/ha		
	Trichoderma 5 kg/h		5 kg/ha		
	Neem cake		200 kg/ha		
Top dressing of organic manures	Source	Quantit	ty/ha	Days after	
				sowing/planting or	
				stage of crop	
	Vermicompost			30	
	Panchagavya	15 lit./ł	na	Spray twice at 45 and 60 DAS	
Irrigation practices	Number	of Most	critical	Depth of irrigation	
	irrigations	stages	for	(cm)	
		irrigatio			
	5		owering	5	
			od filling		
Major weeds	Local name	e Engl	ish name	Scientific name	
	Grasses				
	Jangali Jai	Wild oat		Avena fatua	
	Daub ghas	Bermuda g	grass	Cynodon dactylon	
	Baluri			Phalaris minor	
	-	Bluegrass		Poa annua	
	Broad leaf we			T	
	Chatrimatri	Chickling		Lathyrus sativus	
	Lunia	Common		Portulaca oleracea	
	Keteli	Creeping t	histle	Circium arvense	
	Bathua	Lamb's-qu	arters	Chenopodium album	
	Hirankhuri	Field bind	weed	Convolvulus arvensis	
	Peeli Senji	Yellow sw	eet clover	Melilotus indica	
	Gajri	Fineleaf fu	ımitory	Fumaria parviflora	
	Sedges		•		
	Motha	Yellow nu	tsedge	Cyperus rotundus	
Weed management	Critical stage	Recomm	Recommended practice for organ		
	of weeding		condition Thinning and hand/mechanical weeding		
Ougania plant protection	30 DAS				
Organic plant protection practices	Name of pest/disease	f Organic recomm control		• •	
	Diseases				
	Soil borne diseases	Neem ca	ıke	Soil application of 200 kg/ha	
		P. fluor T. harzid	escence and unum	with @ 5 g/kg seed	
	Alternaria leaf spot / blight White rust	,	wing	By first fortnight of October	

Downey mildew		
Insect-pests		
Mustard saw	Foliar spraying of	At 3% or 5%
fly	neem oil or neem-	concentration,
	seed- kernel-extract	respectively
	Foliar application of	At two leaf stage
	Beauveria bassiana	
Mustard aphid	Early sowing	By first fortnight
		of October
	Foliar spraying of	At 3% or 5%
	neem oil or neem-	concentration,
	seed- kernel-extract	respectively just
		after appearance
		of aphid
		populations

Parameters	1 st year*	2 nd year	3 rd year
Economic yield (kg/ha)	145+9580	6940 + 14200	6420 + 14620
Price (Rs/kg) (25 % premium on	37.5 + 6.3		
prevailing market price)			
Cost of cultivation**(Rs/ha)	44190		
Net returns** (Rs/ha)	73848		

Crop (Summer): Sesbaniagreen manure

Field preparation: After wheat harvest, the field should be immediately irrigated. When field comes in condition field should be prepared by two cross harrowing followed by two planking to ensure proper levelling. Sowing of Dhaincha (*Sesbania*) is done by broadcasting the seeds in field followed by irrigation.

Cultural practices

Seed rate (kg/ha)	20		
Spacing (Row X plant) in cm	Sown by broadc	asting	
Irrigation practices	Number of	Most critical	Depth of irrigation
	irrigations	stages for	(cm)
		irrigation	
	3	At the interval of	5
		15 days	
Optimum stage of harvesting (in	Soil incorporation	on 45 days after sow	ring
case of vegetables and green cob)			

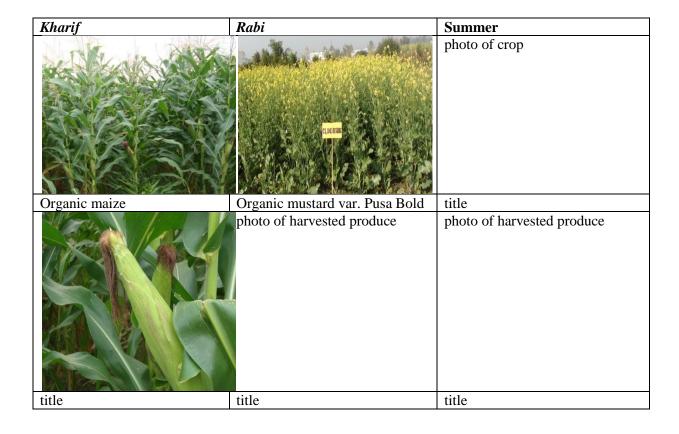
Yield and Economics

Parameters	1 st year*	2 nd year
Biomass production (kg/ha) on dry weight basis	56.2	52.8
Cost of cultivation**(Rs/ha)	2600	

System Economics

	2012-13					
	Maize	Maize Mustard + Sesbania green				
Parameters	(cob)	radish	manure			
Economic yield (kg/ha)	9220	711+14620				
Cost of cultivation (Rs/ha)	40425	35190+9000	2600			
Total system cost of cultivation						
(Rs/ha)	87215					
Net returns (Rs/ha)	74825	73848				
System net returns (Rs/ha)	148673					

Glimpses



Uttarakhand

Package of Practices for Organic Crop Production

Prepared by D.K. Singh, K.P. Raverkar, Chadra Bhushan and Shilpi GuptaG.B. Pant University of Agriculture & Technology, Pantnagar

Suggested cropping systems (based on testing under NPOF)

- 1. Basmati rice- wheat-Sesbania
- 2. Basmati rice- Lentil-Sesbania
- 3. Basmati rice- Vegetable pea-Sesbania
- 4. Basmati rice- Brassica napus -Sesbania
- 5. Basmati rice- Chickpea Sesbania (Under biodynamic practices)

Details of Cropping Systems

Cropping System 1.Basmati rice- wheat-Sesbania

Particulars	Kharif	Rabi	Summer
Crop	Basmati rice	wheat	Sesbania
Fortnight of sowing/planting	Ist fortnight of June(sowing) IInd fortnight of June (Transplanting)	IInd fortnight of November (sowing)	Ist fortnight of May
Fortnight of harvesting	IInd fortnight of October (Harvesting)	IInd fortnight of April (Harvesting)	IInd fortnight of June (incorporation)
Varieties suitable for organic farming	Pusa Basmati-1	PBW- 343/PBW502	Pant Ses-1

Crop (kharif):Basmati Rice

Important features of suitable varieties

Parameters	Pusa Basmati-1
Duration (days)	Medium (130-135days)
Average yield under organic condition (kg/ha)	3500 kg/ha
Source (s) of availability	In-situ organic field
Suitable regions/districts in the state	Udham Singh Nagar
Specific resistance / tolerance to disease	Blast

Nursery raising practices

Area of nursery required for 1	1000 m^2
ha	
Nursery raising method	Wet nursery
Bed size (length X breadth in	5m x 2m
m)	
Seed sowing rate/m ²	30 g

Pre-sowing seed/soil treatment	Materials	Quantity/kg of	Method of
		seed or per m ² area	application
	Common salt	1.65 kg salt/10 l	Dipping the
		of fresh water	seeds
	Pant Bioagent-3	10g/kg seed	Seed treatment
	(mixture of		
	Pseudomonas		
	&Trichoderma)		
Source and optimum quantity	Materials	Quantity/ m ² area	Method of
of organic manures/other			application
nutrient source/m ² of nursery	Sesbania green	1.0-1.5 kg	Incorporation in
	manuring		soil
	FYM	2.5 kg/m^2	broadcast
	Leacheate of		sprays at 10 &
	vermicompost +		20 days after
	ZnSO ₄		sowing
Irrigation practices	3 irrigations		
Weed management	1 HW at 15 DAS		
Organic plant protection	Name of	Recommended organ	ic Quantity/
practices	pest/disease	material used fe	or m ² area
		control	
	Stem borer	(10 0/)	
	Stelli bolei	Cow urine (10 %)	+
	Stelli bolei	Neem cake (10 %)	
	Stem borer		
	-	Neem cake (10 %)	or
	-	Neem cake (10 %) neem oil (1-2%)	or
	-	Neem cake (10 %) neem oil (1-2%) Precautionary spray	or of +
	-	Neem cake (10 %) neem oil (1-2%) Precautionary spray Trichoderma	or of + @
	-	Neem cake (10 %) neem oil (1-2%) Precautionary spray Trichoderma Pseudomonas (each	or of + @ or
	-	Neem cake (10 %) neem oil (1-2%) Precautionary spray Trichoderma Pseudomonas (each of 5g/l) after 15 days	or of + @ or
Optimum age of nursery	20-25 days	Neem cake (10 %) eneem oil (1-2%) Precautionary spray a Trichoderma Pseudomonas (each sight) after 15 days Pant Bioagent-3 @ 1	or of + @ or

Field preparation:For transplanted rice, in-situ *Sesbania* green manure grown and incorporated with the help of mould board plough followed by two round of puddling by puddler.Soil application of PSF & *Trichoderma* each @ 5g/l or Pant Bioagent-3 @ 10 g/l of water (5.0 kg Pant Bio-agent-3 with 500 l water/ha) after incorporation of green manure at the time of soil preparation.

Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application
	Pant Bioagent- 3(<i>Pseudomonas</i> +	250 g/l water	Seedling treatment through
	Trichoderma)		root dipping
Spacing (Row X plant) in cm	20 x10cm		-

Number of seedlings/hill (in nursery crops only)	2				
Basal application of organic	Source	Quantity/ha			
manures including soil	Green manure		15-20 t/ha green biomass		
application of bio-fertilizers,	Green manare	13 20 tha green blomass			
bio-control agents etc					
Top dressing of organic	Source	Quantity/ha	Days after		
manures			sowing/planting		
			or stage of crop		
	V.C. (if FYM has	2.5 t/ha	20 DAT		
	not been applied)				
	Cow urine	50 l/ha (10 % with	3-4 sprays at 15		
	fortified with	500 litre water /ha)	days interval start		
	Neem leaves (one	,	from 20-25 days		
	kg green leaves/		after		
	10 l of urine)		transplanting		
	Or Cow urine +	10% + 1%			
	neem oil				
Irrigation practices	Number of	Most critical stages	Depth of		
	irrigations	for irrigation	irrigation (cm)		
	6-8	Transplanting,	5.0-7.0 cm		
		tillering, PI, flowering & grain	l l		
		filling			
Major weeds	Caiantifia Nama	T7121-			
1viajoi weeds	Scientific Name	English	Name Local		
mujor weeds	Name				
major weeds	Name Echinochloa colonui		Name Local Chotta		
Triajor weeds	Name Echinochloa colonus sawan	m Wild rice	Chotta		
mujor weeds	Name Echinochloa colonus sawan Echinochloa crusgas	m Wild riceBanyard gras	Chotta s Sawan		
Triujoi weeus	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi	m Wild riceBanyard gras	Chotta		
Triajor weeds	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas	m Wild rice lli Banyard gras	Chotta s Sawan <i>American</i>		
mujor weeds	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus	m Wild ricelli Banyard grassPurple nut se	Chotta s Sawan American dge Motha		
Triajor weeds	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria	Wild riceBanyard grassPurple nut seYellow sed	Chotta s Sawan American dge Motha ge Motha		
mujor weeds	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis	m Wild rice lli Banyard gras s Purple nut se Yellow sed Common se	Chotta s Sawan American dge Motha ge Motha edge Motha		
·	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba	m Wild rice lli Banyard gras S Purple nut se Yellow sed Common se false daisy	Chotta S Sawan American dge Motha ge Motha edge Motha Jal bhangra		
Weed management	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba	m Wild rice lli Banyard gras S Purple nut se Yellow sed Common se false daisy	Chotta S Sawan American dge Motha ge Motha edge Motha Jal bhangra		
·	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of	m Wild rice lli Banyard gras s Purple nut se Yellow sed Common so false daisy Recommended pra	Chotta s Sawan American dge Motha ge Motha edge Motha Jal bhangra actice for organic		
·	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of weeding	m Wild rice lli Banyard gras S Purple nut se Yellow sed Common se false daisy Recommended pre condition One mechanica	Chotta s Sawan American dge Motha ge Motha edge Motha Jal bhangra actice for organic		
·	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of weeding	m Wild rice lli Banyard gras S Purple nut se Yellow sed Common se false daisy Recommended pre condition One mechanica	Chotta S Sawan American dge Motha ge Motha edge Motha Jal bhangra actice for organic weeding by AT followed by one		
·	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of weeding	M Wild rice Banyard grass Purple nut se Yellow sed Common se false daisy Recommended pracondition One mechanical conoweeder at 15 D	Chotta S Sawan American dge Motha ge Motha edge Motha Jal bhangra actice for organic weeding by AT followed by one g 25 & 45 DAT		
Weed management	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of weeding 20 & 40 DAT	M Wild rice Ili Banyard gras Purple nut se Yellow sed Common se false daisy Recommended pra condition One mechanical conoweeder at 15 D or two hand weedin	Chotta S Sawan American dge Motha ge Motha edge Motha Jal bhangra actice for organic weeding by AT followed by one g 25 & 45 DAT Quantity (kg or		
Weed management Organic plant protection	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of weeding 20 & 40 DAT Name of	M Wild rice Response of the work of the w	Chotta S Sawan American dge Motha ge Motha edge Motha Jal bhangra actice for organic weeding by AT followed by one g 25 & 45 DAT Quantity (kg or		
Weed management Organic plant protection	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of weeding 20 & 40 DAT Name of pest/disease Yellow stem borer,	M Wild rice Banyard grass Purple nut se Yellow sed Common se false daisy Recommended pracondition One mechanical conoweeder at 15 D or two hand weedin Organic material recommended for	Chotta S Sawan American dge Motha ge Motha edge Motha Jal bhangra actice for organic weeding by AT followed by one g 25 & 45 DAT Quantity (kg or		
Weed management Organic plant protection	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of weeding 20 & 40 DAT Name of pest/disease Yellow stem borer, Leaf folder,	M Wild rice Banyard gras Purple nut se Yellow sed Common se false daisy Recommended pre condition One mechanical conoweeder at 15 D or two hand weedin Organic material recommended for control	Chotta S Sawan American dge Motha ge Motha edge Motha Jal bhangra actice for organic weeding by AT followed by one g 25 & 45 DAT Quantity (kg or litres/ ha) 20 traps/ha		
Weed management Organic plant protection	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of weeding 20 & 40 DAT Name of pest/disease Yellow stem borer, Leaf folder, Brown plant	Purple nut se Yellow sed Common se false daisy Recommended pre condition One mechanical conoweeder at 15 D or two hand weedin Organic material recommended for control Pheromone traps	Chotta S Sawan American dge Motha ge Motha Dal bhangra actice for organic weeding by AT followed by one g 25 & 45 DAT Quantity (kg or litres/ ha) 20 traps/ha 50 l/ha (10 %		
Weed management Organic plant protection	Name Echinochloa colonus sawan Echinochloa crusgas Leptochloa chinensi ghas Cyperus rotundus Cyperus iria Cyperus difformis Eclipta alba Critical stage of weeding 20 & 40 DAT Name of pest/disease Yellow stem borer, Leaf folder,	Purple nut se Yellow sed Common se false daisy Recommended pre condition One mechanical conoweeder at 15 D or two hand weedin Organic material recommended for control Pheromone traps Cow urine fortified	Chotta S Sawan American dge Motha ge Motha Jal bhangra actice for organic weeding by AT followed by one g 25 & 45 DAT Quantity (kg or litres/ ha) 20 traps/ha 50 l/ha (10 % with 500 litre		

	urine) or Cow urine	+ 5 litre neem
	+ neem oil (10 %	oil/ha.
	+1%)	
Bacterial leaf	Cow urine fortified	50 litre cow urine
blight	with Neem leaves	+ 5 kg Pant Bio-
Sheath blight	(one kg green	agent 3 in 500
Sheath rot	leaves/ 10.0 1 of	litre of water /ha
Brown leaf spot	urine) +	
	Trichoderma +	
	Pseudomonas	
	(each @ 5g/l) after	
	or Pant Bioagent-3	
	@ 10 g/l of water	

Parameters		2004	2005	2006	2007	2008	2009	2010	2011	2012*
Economic (kg/ha)	yield	2266	2344	2456	2963	3445	2885	3113	3715	3925
	(Rs/kg) 25 % on market	Rs. 35.	00							
Cost cultivation*(F	of Rs/ha)	Rs.268	57 (year	2012)						
Net returns*	(Rs/ha)	Rs.129	156 (yea	ır 2012)						

^{*}based on prices of 2013-14

Crop (Rabi):Wheat

Important features of suitable varieties

Parameters	PBW-343
Duration (days)	Medium (135-150days)
Average yield under organic condition (kg/ha)	2911 kg/ha
Source (s) of availability	In-situ
Suitable regions/districts in the state	Indo Gangetic Plain (U.S.Nagar)
Specific resistance / tolerance to disease	Resistant to brown and yellow rust,
	tolerant to Karnal Bunt

Field preparation: After harvest of rice, **o**ne ploughing followed by two harrowing was done.

O 0-200-2	tte pett			
Seed	rate	(kg/ha)	(Not	100 kg/ha
applica	ble for	nursery cro	ops)	

Pre-sowing/planting treatment of seed/seedlings	Material	Recommended (kg/ha or lit/ha)			
	`		Seed treatment		
Spacing (Row X plant) in cm	22 cm				
Basal application of organic	Source	Quantity/	ha		
manures including soil	FYM	10 t/ha			
application of bio-fertilizers, bio-control agents etc	Vermicompost	5 t/ha			
Top dressing of organic manures	Source	Quantity/ha	Days after sowing/planting or stage of crop		
	Cow urine	50 l/ha (10 %	Two sprays at 30		
	fortified with	with 500 litre	and 60 days after sowing		
	Neem leaves (one kg green leaves/ 101 of urine)				
Irrigation practices	Number of	Most critical	Depth of irrigation		
	irrigations	stages for	(cm)		
	3-4	irrigation root	5-6 cm		
	3-4	Crown root initiation,	3-6 CIII		
		tillering,			
		flowering and			
		grain-filling			
		stage			
Major weeds	Scientific Name	Englis	h Name Local		
	Name Phalaris minor mama	Bird's seed gra	ass Gehun ka		
	Chenopodium albur	n Goose foot	Bathua		
	Lathyirus aphaca	Crow pea Chatri-i			
	Melilotus alba Senji	White sweet	t clover Sufaid		
	Melilotusindica	Yellowsweetclov	<i>y</i>		
	Fumaria perviflora	Fumitory	Jungli gazar		
	Anagallis arvensis neel	Blue pimpernel Krishna			
Weed management	Critical stage of weeding	condition	ractice for organic		
	30 & 45 DAS	Stale bed + one lead hand weeding	hand weeding or two		
Organic plant protection practices	Name of pest/disease	Organic material recommended	Quantity (kg or litres/ ha)		
		for control			

Wheat aphid	Cow urine	50 l/ha (10 % with
	fortified with	500 litre water /ha).
	Neem leaves	or
	(one kg green	50 litre cow urine +
	leaves/ 10.0 1 of	5 litre neem oil/ha
	urine) or Cow	
	urine + neem oil	
	(10 % +1%)	
Brown rust,	Cow urine +	10% cow urine +
Yellow rust,	Pant Bioagent-3	10 g/l of water
Powdery mildew	(mixture of	(50 litre cow urine
-	Pseudomonas +	+ 5 kg Pant Bio-
	Trichoderma)	agent 3 in 500 litre
		water/ha)

Parameters	8	2004- 05	2005- 06	2006- 07	2007- 08	2008- 09	2009- 10	2010-11	2011-12	2012-13
Economic (kg/ha)	yield	1383	1735	2662	2359	2493	3645	3677	4103	4142
Price (consider premium prevailing price)	(Rs/kg) 25 % on market	Rs.16.9	90 (2012	2-13)						
Cost cultivation*	of (Rs/ha)	Rs.332	62.00 (2	2012-13)					
Net (Rs/ha)	returns*	Rs.366	55.00 (2	2012-13)					

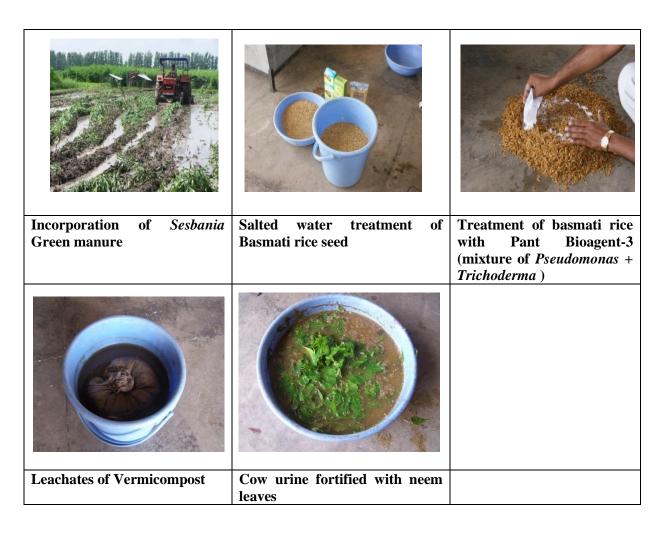
^{*}based on prices of 2013-14 Crop (Summer): Sesbania

Important features of suitable varieties

Parameters	(Pant Ses-1)					
Duration (days)	50-55 days					
Average yield under organic condition	16000 kg/ha(green biomass); 3450 kg/ha (dry					
(kg/ha)	matter)					
Source (s) of availability	Seed Production Centre, Pantnagar					
Suitable regions/districts in the state	U.S.Nagar					

Field preparation: After harvest of *Rabi* crops, field was harrowed and seeds of *Sesbania* were sown @ 30 kg/ha. It should be ensured that moisture availability should be there otherwise, irrigation should be given immediate after sowing of *Sesbania* seed.

Glimpses



Kharif	Rabi	Summer
Organic		ORGANIC
Organic Basmati rice (var.	Organic wheat (PBW 343)	Sesbania green manure (var.
PB-1)		Pant Ses-1)

Cropping System 2: Basmati rice- Lentil-Sesbania

Particulars	Kharif	Rabi	Summer	
Crop	Basmati rice	Lentil	Sesbania	

Fortnight	of	Ist f	ortnight	(FN)	of	IInc	l	FN	of	Ist FN	N of M	Iay	
sowing/planting		June	sowing))		November							
		IInd	fortnigh	nt of	June	(sov	(sowing)						
		(Transplanting)											
Fortnight	of	IInd	fortn	ight	of	Ist	FN	of	April	IInd	FN	of	June
harvesting	harvesting October (Harvesting)			(Ha	rvest	ing)		(Harv	esting	g)			
Varieties suitable for Pusa basmati-1			Pant Lentil-6			Pant Ses-1							
organic farming													

Crop (kharif):Basmati Rice (Information on rice has already been given in Cropping system-1)

Crop (Rabi): Lentil

Important features of suitable varieties

Variety	Pant Lentil-6
Duration (days)	Medium (120-135)
Average yield under organic condition (kg/ha)	851 kg/ha
Source (s) of availability	In-situ
Suitable regions/districts in the state	U.S.Nagar
Specific resistance / tolerance to pest	Tolerant to pod borer
Specific resistance / tolerance to disease	Resistant to rust, wilt and
	Aschochyta blight

Field preparation: After harvest of rice, **o**ne ploughing followed by two harrowing was done.

Seed rate (kg/ha)	30 kg/ha			
Pre-sowing/planting treatment of seed/seedlings	Material	Recomme	ended g/ha or	Method of application
treatment of seed/seedings		lit/ha)	g/IIa OI	
	Pant	10g/kg se	eed	Seed treatment
	Bioagent-3			
	(mixture of			
	Pseudomonas			
	+			
	Trichoderma)			
Spacing (Row X plant) in	30 x 10cm			
cm				
Basal application of	Source		Quantity/	ha
organic manures including	FYM		5t/ha	
soil application of bio-				
fertilizers, bio-control	Vermicompost		2.5t/ha	
agents etc				

Top dressing of organic manures	Source	Quantity/ha	Days after sowing/planting or stage of crop
	Cow urine fortified with Neem leaves (one kg green leaves/ 10 l of urine)	50 l/ha (10 % with 500 litre water /ha)	Two sprays at 30 and 60 days after sowing
Major weeds	Scientific Name	English Name	Local
	Phalaris minor mama	Bird's seed grass	Gehun ka
	Chenopodium	Goose foot	Bathua
	album Lathyirus aphaca	Crow pea	Chatri-
	matri Melilotus alba	White sweet clover	Sufaid
	Senji		Zard
	Melilotusindica Senji	Yellowsweetclover	Jungli
	Fumaria	Fumitory	
	perviflora		Krishna -
	gazar Anagallis arvensis	Blue pimpernel	
	neel		
Weed management	Critical stage	Recommended pra	actice for organic condition
	of weeding	Γ .	
	25 & 45 DAS	Stale bed + hand v	weeding or one mechanical
		+ one hand weeding	_
Organic plant protection practices	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)
	Wilt	Cow urine +	10% cow urine + 10 g/l
	Rust	Pant Bioagent-3	of water
	22000	(mixture of	(50 litre cow urine + 5 kg
		Pseudomonas +	Pant Bio-agent 3 in 500
		Trichoderma)	litre water/ha); 5-6 sprays
		,	are required in 15 days intervals

Parameters	2004-	2005-	2006-	2007-	2008-	2009-	2010-	2011-
	05	06	07	08	09	10	11	12*
Economic yiel (kg/ha)	354	445	774	731	972	601	1234	1702

Price	(Rs/kg)	Rs.35.00 (2011-12)
(consider	25 %	
premium	on	
prevailing	market	
price)		
Cost	of	Rs.25318(2011-12)
cultivation	*(Rs/ha)	
Net	returns*	Rs.34252(2011-12)
(Rs/ha)		

^{*}based on prices of 2013-14

Crop (Summer): Sesbania (Information has already been given in cropping system 1)

Glimpses



Cropping System 3: Basmati rice- Vegetable Pea-Sesbania

Particulars		Kharif			Rabi				Summer			
Crop		Basmati	Basmati rice			Vegetable pea			Sesbania			
Fortnight	of	Ist FN c	f June(sowing)	IInc	1	FN	of	Ist FN of May			
sowing/planting		IInd	IInd FN of June			November (sowing)						
		(Transp	lanting))								
Fortnight	of	IInd F	N of	October	Ist	FN	of	March	IInd	FN	of	June
harvesting		(Harves	ting)		(Ha	rvest	ing)		(Harv	esting	g)	
Varieties suitable	for	Pusa Ba	smati-1		Ark	el			Pant	Ses-1		
organic farming												

Crop (kharif):Basmati Rice (Information on rice has already been given in Cropping system-1)

Crop (Rabi):Vegetable pea

Important features of suitable varieties

Parameters	Arkel
Duration (days)	Early (90-120d)
Average yield under organic condition (kg/ha)	4331 kg/ha
Source (s) of availability	In-situ
Suitable regions/districts in the state	U.S.Nagar
Specific resistance / tolerance to disease	Susceptible to powdery mildew

Field preparation: After harvest of rice, **o**ne ploughing followed by two harrowing were done.

Seed rate (kg/ha)	80					
Pre-sowing/planting treatment of seed/seedlings	Material	Recomm rate (k lit/ha)	ended g/ha or	Method of application		
	Pant Bioagent-3 (Pseudomonas + Trichoderma)	10g/kg s	eed	Seed treatment		
Spacing (Row X plant) in cm	30 x 10cm					
Basal application of organic	Source		Quantity/	ha		
manures including soil application of bio-fertilizers, bio-	FYM		5.0 t/ha			
control agents etc	Vermicompost		2.5 t/ha			
Top dressing of organic manures	Source	Quantit	y/ha	Days after sowing/planting or stage of crop		
	Cow urine fortified with Neem leaves (one kg green leaves/ 10 1 of urine)	water /h	500 litre	3-4 sprays at 15 days interval start from 20-25 days after transplanting		
Irrigation practices	Number of irrigations	stages irrigation		Depth of irrigation (cm)		
	1	Pre-flov		2-3 cm		
Major weeds	Scientific Name Name			sh Name Local		
	Phalaris minor mama		ird's seed g			
	Chenopodium al		Goose foot	Bathua		
	Chenopodium m	urale	Fat hen	Karund		
	Melilotus alba Senji		White swee	et clover Sufaid		

	Melilotusindica	Yellow sweed	clover Zard
	Senji Fumaria perviflo gazar	ra Fumitory	Jungli
	Cynodon dactylo	n	doob-ghas
Weed management	Critical stage of weeding	Recommended p condition	ractice for organic
	25 & 45 DAS		echanical + 1 Hand ethanical + 1 HW at
Organic plant protection practices	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)
	Rust, Powdery Mildew, Blight	Pseudomonas florescence & Trichoderma spp.	Each @ 5g/L at the time of soil preparation, before and after flowering to control disease.
	Pea leaf minor, Pod borer	Cow urine fortified with Neem leaves (one kg green leaves/ 10.0 l of urine) or Cow urine + neem oil (10 % +1%)	50 l/ha (10 % with 500 litre water /ha). 50 litre cow urine + 5 litre neem oil/ha.
Optimum stage of harvesting (in case of vegetables and green cob)	90-100 days		

Parameters		2004- 05	2005- 06	2006- 07	2007- 08	2008- 09	2009- 10	2010- 11	2011- 12	2012- 13
Economic (kg/ha)	yield	3408	3198	2573	2479	3393	3941	5534	6272	6320
(consider 2. premium	Rs/kg) 5 % on market									
Cost cultivation*(R	of s/ha)	Rs.28408/ha (2012-13)								
Net returns* ((Rs/ha)	Rs.505	92/ha (2	012-13)						

^{*}based on prices of 2013-14

Glimpses





Treatment of lentil with Pant Bioagent-3 (mixture of *Pseudomonas + Trichoderma*)

Vegetable pea under organic mode

Cropping System 4: Basmati rice-Brassica napus -Sesbania

Particulars	Kharif	Rabi	Summer
Crop	Basmati rice	B.napus	Sesbania
Fortnight of sowing/planting	Ist FN of June(sowing) IInd FN of June (Transplanting)	Ist FN of November (sowing)	Ist FN of May
Fortnight of harvesting	IInd FN of October (Harvesting)	Ist FN of April (Harvesting)	IInd FN of June (Harvesting)
Varieties suitable for organic farming	Pusa basmati-1	GLS-1	Pant Ses-1

Crop (kharif):Basmati Rice (Information on rice has already been given in Cropping system-1)

Crop (Rabi):Brassica napus

Important features of suitable varieties

Variety	GLS-1
Duration (days)	Medium (135-150days)
Average yield under organic condition (kg/ha)	956 kg/ha

Source (s) of availability	In-situ
Suitable regions/districts in the state	U.S.Nagar

Field preparation: After harvest of rice, **o**ne ploughing followed by two harrowing were done.

Seed rate (kg/ha)	2-3 kg/ha				
Pre-sowing/planting treatment of	Material	Recomm	ended	Meth	nod of
seed/seedlings		rate (k	rate (kg/ha or		ication
		lit/ha)	lit/ha)		
	Pant	10g/kg s	eed	Seed	treatment
	Bioagent-3				
	(Pseudomonas				
	+				
	Trichoderma)				
Spacing (Row X plant) in cm	30X20				
Basal application of organic	Source		Quantity/	ha	
manures including soil	FYM		10.0 t/ha		
application of bio-fertilizers, bio-					
control agents etc	Vermicompost		5.0 t/ha		
Top dressing of organic manures	Source	Quantit	y/ha	Days	s after
				sowi	ng/planting or
				stage of crop	
	V.C.	5 t/ha		20 DAS	
	FYM	10t/ha		Basal	
	Cow urine		a (10 %	* *	
	fortified with	with :			
	Neem leaves	water /l	na)	from 20-25 days	
	(one kg green			after	transplanting
	leaves/ 10 1 of				
	urine)	1001	4		
	Or Cow urine+	10% +	1%		
*	neem oil	3.6			1 0 1 1 1
Irrigation practices	Number of		critical		th of irrigation
	irrigations	stages	for	(cm)	
		irrigatio	on		
Majorwands	Coiontifia Marra	T7 1	liah Massas		Local Name
Major weeds	Scientific Name	_	lish Name		Local Name
	Phalaris minor Bird's se		_	SS	Gehun ka
	Chenopodium album				mama Bathua
	album Crow pea Lathyirus aphaca Field binweed			Chatri-matri	
	Convolvulus	khur			Hiran
	arvensis		te sweet clo	over	1111 (111
	Melilotus alba		ow sweech		Sufaid
	Melilotusindica		itory	, v O1	Senji
	Memorasinarea	I ulli	1101 y		Senji

	Fumaria perviflo Anagallis arvens Cynodon dactylo	is	Zard Senji Jungli gazar Krishna –neel doob-ghas
Weed management	Critical stage of weeding 20 & 40 DAS	condition	nd weeding or one ng + 1 HW
Organic plant protection practices	Root rot, White rust, Downey mildew Mustard Aphid,	Organic material recommended for control Pseudomonas florescence & Trichoderma spp. Cow urine fortified with Neem leaves (one kg green leaves/ 10.0 l of urine) or Cow urine + neem oil (10 % +1%)	Quantity (kg or litres/ha) each @ 5g/L at the time of soil preparation, before and after flowering to control disease. 50 l/ha (10 % with 500 litre water /ha). 50 litre cow urine + 5 litre neem oil/ha.

Parameters	2004- 05	2005- 06	2006- 07	2007- 08	2008- 09	2009- 10	2010- 11	2011- 12	2012- 13
Economic yield (kg/ha)	342	300	603	785	840	915	1158	1777	1886
Price (Rs/kg) (consider 25 % premium on prevailing market price)	Rs.31.3 (2012-13)								
Cost of cultivation*(Rs/ha)	Rs. 290	564/ha (2	2012-13)					
Net returns* (Rs/ha)	Rs.292	74/ha (2	(012-13)	1					

^{*}based on prices of 2013-14

Crop (Summer):Sesbania (Information has already been given in cropping system 1)

Glimpses





Treatment of mustard seed with Pant Bioagent-3 (mixture of *Pseudomonas* + *Trichoderma*)

Mustard crop under organic mode

Cropping System 5: Basmati rice- chick pea under biodynamic practices

Particulars	Kharif	Rabi	Summer	
Crop	Basmati rice	Chickpea	Sesbania	
Fortnight of	Ist fortnight of	IInd fortnight of	Ist fortnight of May	
sowing/planting	June(sowing)	November (sowing)		
	IInd fortnight of June			
	(Transplanting)			
Fortnight of	IInd fortnight of	IInd fortnight of	IInd fortnight of	
harvesting	October (Harvesting)	April (Harvesting)	June	
			(incorporation)	
Varieties suitable for	Pusa -1121	Pant Kabuli Chana-1	Pant Ses-1	
organic farming				

Crop (kharif):Basmati Rice

Important features of suitable varieties

Parameters	Pusa 1121
Duration (days)	Medium (135-140 days)
Average yield under organic condition	3958 kg/ha
(kg/ha)	
Source (s) of availability	In-situ organic field
Suitable regions/districts in the state	Udham Singh Nagar

Nursery raising practices

Area of nursery required for 1	1000 m^2
ha	
Nursery raising method	Wet nursery
Bed size (length X breadth in	5m x 2m

m)				
Seed sowing rate/m ²	30 g			
Pre-sowing seed/soil treatment	Materials	Quantity/kg of seed or per m ² area	Method of application	
	Common salt	1.65 kg salt/10 l of fresh water	Dipping the seeds	
	Pant Bioagent-3(mixture of Pseudomonas &Trichoderma)	10g/kg seed	Seed treatment	
Source and optimum quantity of organic manures/other	Materials	Quantity/ m ² area	Method of application	
nutrient source/m ² of nursery	Sesbania green manuring	1.0-1.5 kg	Incorporation in soil	
	FYM	2.5 kg/m^2	broadcast	
	Leachates of vermicompost + ZnSO ₄	10% + 0.5 %	sprays at 10 & 20 days after sowing	
Irrigation practices	3 irrigations			
Weed management	1 HW at 15 DAS			
Organic plant protection practices	Name of pest/disease	Recommended organ for control	nic material used	
		Leacheate of Vermurine (10 %) + Nee neem oil (1-2%)	_	
		Trichoderma + Pseudomonas (each @ 5g/l) after 15 days or Pant Bioagent-3 @ 10 g/l of water		
Optimum age of nursery (days)	20-25 days			

Field preparation: For transplanted rice, in-situ *Sesbania* green manure grown and incorporated with the help of mould board plough followed by two round of puddling by puddler. Soil application of PSF & *Trichoderma* each @ 5g/l or Pant Bioagent-3 @ 10 g/l of water (5.0 kg Pant Bio-agent-3 with 500 l water/ha) was done after incorporation of green manure at the time of soil preparation.

Pre-sowing/planting	Material	Recommended rate	Method of
treatment	•	(kg/ha or lit/ha)	application
seed/seedlings	Pant Bioagent-	250 g/l water	Seedling
	3(Pseudomonas+		treatment through
	Trichoderma)		root dipping
Spacing (Row X plant) in	20 x 10cm		
cm			
Number of seedlings/hil	2		

(in nursery crops only)						
Basal application of	Source	Quantity/ha				
organic manures including						
soil application of bio- fertilizers, bio-control						
agents etc						
agonts etc	Green manure		16-20 t/ha			
	Soil application of BD-	500	62.5g/ha	a		
	FYM E.C		5t/ha			
	E.C		5t/ha			
	Source	Quanti	ty/ha	Days after		
Top dressing of organic			sowing/planting			
manures			or stage of crop			
	V.C.	2.5 t/ha		20 DAT		
	N.C. BD-501	0.5 t/ha		20 DAT		
	BD-201	2.5g/ha	ı	Flowering & seed-setting		
				stage(as per		
				biodynamic		
				calendar)		
	CPP	2.5kg/ha		Flowering &		
				seed-setting stage		
	Panchgavya @0.3% (1.5 1		Flowering & 15			
		Cow urine fortified with Neem leaves one kg green leaves/101 of urine) 50 l/ha (10 % with 500 litre water /ha)		days after flowering		
	Cow urine fortified			3-4 sprays at 15		
				days interval start		
	(one kg green leaves/			from 20-25 days		
	10 l of urine)			after		
	27 1 21 1			transplanting		
Irrigation practices	Number of irrigations	Most critical stages		Depth of		
	6-8	for irrig	gation lanting,	irrigation (cm) 5.0-7.0 cm		
	0-8	tillerin	_	3.0-7.0 Cm		
			ing & grain			
		filling				
Major weeds (give local,	Scientific Name		nglish Name	Local Name		
english and scientific	Echinochloa colonum	Wi	ld rice	Chotta		
name)	sawan Echinochloa crusgalli	Das	word aross	Sawan		
	Leptochloa chinensis	Banyard grass		American ghas		
	Cyperus rotundus	Purple nut sedge Motha Yellow sedge Motha		0		
	Cyperus iria					
	Cyperus difformis	\mathcal{E}				
XX 1	Eclipta alba		alse daisy	Jal bhangra		
Weed management	Critical stage of					
	<u> </u>			condition One mechanical weeding by		
	20 & 40 DAT	One mechanical weeding				

		conoweeder 15 DAT followed by one			
		or two hand weeding	25 & 45 DAT		
Organic plant protection	Name of pest/disease	Organic material	Quantity (kg or		
practices		recommended for	litres/ ha)		
		control			
	Yellow stem borer	Pheromone traps	20 traps/ha		
	Leaf folder				
	Brown plant hopper	Cow urine fortified	50 l/ha (10 %		
		with Neem leaves	with 500 litre		
		(one kg green	water /ha).		
		leaves/ 10.0 l of	50 litre cow urine		
		urine) or Cow urine	+ 5 litre neem		
		+ neem oil (10 %	oil/ha.		
		+1%)			
	Bacterial leaf blight	Cow urine fortified	50 litre cow urine		
	Sheath blight	with Neem leaves	+ 5 kg Pant Bio-		
	Sheath rot	(one kg green	agent 3 in 500		
	Brown leaf spot	leaves/ 10.0 1 of	litre of water /ha		
		urine) +			
		Trichoderma +			
		Pseudomonas			
		(each @ 5g/l) after			
		or Pant Bioagent-3			
		@ 10 g/l of water			

Tiela and Leonomies				
Parameters	2009	2010	2011	2012*
Economic yield (kg/ha)	3598	3144	4555	4535
Price (Rs/kg) (consider 25 % premium on prevailing market price)	Rs. 35.0	00 (2012)		
Cost of cultivation*(Rs/ha)	Rs.2689	97(2012)		
Net returns* (Rs/ha)	Rs.131	868(2012)		

^{*}based on prices of 2013-14

Crop (Rabi):Chickpea

Important features of suitable varieties

Variety	Pant Kabuli Chana-1
Duration (days)	Medium (120-135)
Average yield under organic condition (kg/ha)	1809 kg/ha
Source (s) of availability	In-situ
Suitable regions/districts in the state	U.S.Nagar
Specific resistance / tolerance to disease	Resistant to botrytis grey mould

Field preparation: After harvest of rice, **o**ne ploughing followed by two harrowing was done.

Seed rate (kg/ha)	30 kg/ha				
Pre-sowing/planting treatment of			Method of		
seed/seedlings		rate (kg/ha or lit/ha)	application		
	Pant Bioagen		Seed treatment		
	3 (mixture	0 0	Seed treatment		
	Pseudomona,				
	+				
	Trichoderma)			
Spacing (Row X plant) in cm	30 x 10cm	<u> </u>			
Recommended NPK and micro	20:60:40 NP	K			
nutrient dose for the crop (kg/ha)					
Basal application of organic	Source		Quantity/ha		
manures including soil application of bio-fertilizers, bio-	Soil applicati	on of BD-500	62.5g/ha		
control agents etc	FYM		2.0 t/ha		
	E.C		2.0 t/ha		
	V.C.		1.0 t/ha		
	N.C.		0.2t/ha		
Top dressing of organic manures	Source	Quantity/ha	Days after		
			sowing/planting or stage of crop		
	BD-501	2.5g/ha	Flowering & fruit-		
			setting stage(as		
			per biodynamic		
			calendar)		
	CPP	2.5kg/ha	Flowering & fruit-		
			setting stage		
	Panchgavya	@0.3% (1.5 1	Flowering & 15		
		Panchgavya in 500 1	days after		
	C	of water)	flowering		
	Cow urine fortified	50 1/ha (10 % with	Two sprays at 30		
	with Neem	500 litre water /ha)	and 60 days after sowing		
	leaves (one		Sowing		
	kg green				
	leaves/ 10 1				
	of urine)				
Irrigation practices	Number of	Most critical stages			
	irrigations	for irrigation			
	1	Flowering or pod			
		formation			
Major weeds	Scientific Name English Name Local				

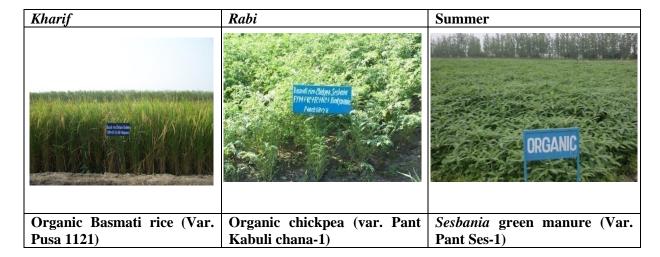
	Name		
	Phalaris mino	Pr Bird's seed g	grass Gehun ka
	mama		
	Chenopodium	album Goose foot	Bathua
	Chenopodium	murale Fat hen	Karund
	Melilotus alba	white sweet	clover Sufaid
	Senji		
	Melilotusindic	ra Yellowsweetc	lover Zard
	Senji		
	Fumaria pervi	iflora Fumitory	Jungli
	gazar	C.	
	Vicia sativa	Common	vetch Choti
	phalli/Akra	ongia Di	ama al Warialan
	Anagallis arve neel	ensis Blue pimp	pernel Krishna -
Weed management	Critical	Recommended pra	ctice for organic
weed management	stage of	condition	ettee for organic
	weeding	Condition	
	20 & 40	Stale bed + hand wee	ding
	DAS		8
Organic plant protection	Name of	Organic material	Quantity (kg or
practices	pest/disease	recommended for	litres/ ha)
		control	
	Wilt, Blight	Cow urine + Pant	10% cow urine +
		Bioagent-3 (mixture	10 g/l of water
		of Pseudomonas +	(50 litre cow urine
		Trichoderma)	+ 5 kg Pant Bio-
			agent 3 in 500 litre
			water/ha); 5-6
			sprays are required in 15 days intervals
	Pod borer	Cow urine fortified	in 15 days intervals
	1 ou boici	with Neem leaves	
		(one kg green	
		leaves/ 10 l of	
		urine)	
		HNPV	1.5 l/ha
	I	I .	I

Parameters	2009-10	2010-11	2011-12	2012-13*
Economic yield (kg/ha)	1458	1335	2003	2440
Price (Rs/kg) (consider 25 % premium on prevailing market price)	Rs.52.5 (2012-13)			
Cost of cultivation*(Rs/ha)	Rs.28869 (2	2012-13)		
Net returns* (Rs/ha)	Rs.99231 (2	2012-13)		

^{*}Consider last year yield and cost of cultivation of the crop for calculating the economics

Glimpses





Details of Specific Practices/products used/recommended

(Please give details of *panchagavya*, cow urine, BD preparation and any other ITK products including its method of preparation etc)

Neem fortified cow urine: Cow urine was fortified with neem leaves @ 1kg fresh neem leaves in 10 l of cow urine kept for 10 to 15 days. Alternately, 1% neem oil can also be used for the fortification of cow urine at the time of spraying.

Panchgavya: Panchgavya is basically the mixture of five main ingredients *viz.*, cow dung, cow ghee, cow urine, cow milk and cow curd. In addition to above five ingredients, tender coconut water, jaggery and well ripened banana can also be used for its preparation. For preparation of panchgavya, mix cow dung (7kg) and cow ghee (1kg) in a wide-mouthed plastic can and should be mixed in morning and evening hours and kept for 3 days. After 3 days, mix cow urine (10 l) and water (10 l) and keep it for 15 days with regular mixing both in morning and evening hours. After 15 days, mix cow milk (3 l), cow curd (2 l), tender coconut water (3 l), Jaggery (3 kg) and well ripened banana (12 nos.) and container should be kept open under shade and stock Panchgavya solution will be ready after 30 days.

BD-500 (Cow horn Manure): It is basically fermented cow dung which is buried in September-November and lifted in February-March. For the preparation of BD-500, cow horns and fresh cow dung from a lactating cow is needed (average 50-150g dung/horn). For this burial pits were prepared (18 inches deep) and the pit area should not be subject to flooding, vigorous root systems or earthworms. Filled cow horns with cow dung in October-November were placed in burial pits, 1 inches apart with base downwards, surrounded with 50% compost and soil and bury for 4 to 6 months keeping the burial pit soil moist and shaded at temperature approximately 20°C and free from weeds and earthworms. After 4 months, check for dung fermentation (if green cow dung has turned into dark, smooth earthy smelling humus) and lifted.

BD-501(Cow horn Silica): It is finely ground quartz crystals especially prepared. The crystals used should be of good quality, shape and clear. It is buried in the similar manner to preparation of BD-500 but this time buried during the summer time (April-May and lifted in September). For the preparation of BD-501, cow horns and silica quartz crystals are needed (average 200-300g powdered quartz crystals/horn). Silica quartz is crushed and grinded to make a fine powder between two plate glasses and moisten with water to make a stiff paste to fill the horns and buried in soil pit, 1 inch apart with base downwards surrounded with 50% compost and soil.

Cow Pat Pit (CPP): It is cow manure mixed with crushed egg shell and basalt dust, which is put into 12 inches deep pit lined with bricks. The dung is fermented, together with preparation 502-507 for a period of 3 to 4 months. When mature, it is mixed with water, @ 1 kg in 40 litres of water per acre (1 CPP pit is sufficient to cover 40 acres) and 60 kg of cow dung gives about 30-35 kg of CPP after fermentation. CPP is applied in the evening during the cooler months.