SUGGESTED GUIDELINES FOR CONDUCTING REGIONAL TRIALS

Julio César Toro M.

Regional Trial

Regional trial is an experiment where a large number of varieties (no more than 20) are agronomically evaluated under a uniform technology to see its geographical adaptability and yield potential over a wide range of ecological conditions as compared to the best local prevalent variety.

Objectives

1. To validate current cassava technology produced by the cassava program team.

2. To transfer this techonology to national agencies once it proves adequate results.

3. To extrapolate results to other parts of the world.

Criterion

Since we can not have a germplasm bank everywhere we need to evaluate our promising materials across contrasting regions once this material has already undergone preliminary yield trials conducted by the Breeding pro - gram. We have to measure the performance of these varieties before we think in releasing them to the national agencies.

Guidelines

1. Identify collaborating Institutions. National agencies must have the need and interest in cassava before we think in planting a trial, otherwise, it could be a waste of time and effort.

2. Selection of sites. In a given country, we should consider, the actual cassava growing areas so that trials are more representative and most relevant. These sites should be selected in visible fields so that farmers of the region have an easy access to them.

3. Identify the responsible person. Usually, we prefer to work with a person in which we can trust, and relay in order to get appropriate management of the trial. We prefer to give a training to this person, before a Regional trial is undertaken.

   Usually, we can not trust in data that an inexperienced person in cassava will hand to us. We have to be sure that data is fine and well taken so we can be confident of what it represents and means.

4. Time of planting . This is decided after consulting with cassava farmers of what is the most common time they use in a given region. Since the trials are not irrigated, we usually plant at the beginning of the rainy season.

5. Time of harvesting. We follow the most common practice used by the farmers of the region under study. In the case of Colombia, this usually occurs between 10 and 12 months in regions below 1.000 meters of elevation; above this altitude we delay one month for every 100 meters of elevation. As a rule of thumb.

6. Design. The trials should be planted in randomized blocks with a minimum of four replications.

7. Size of the plot. Plots located at the end of each block will have 9 x 8 = 72 plants and those located in the middle will have 8 x 8 = 64 plants. In both cases, the area occupied by the middle 24 plants will be harvested from each plot. In plants are missing at harvest, they should not be replaced by border plants. The number missing should be noted. Yield will be given by area not by number of plants in the plot.

8. Border rows. As can be seen in the enclosed diagram, it is recommended to leave 2 border rows in each plot for each variety in order to eliminate border effects because of competition for light and water mainly due to the different growth habits of the varieties.

9. Aisles. For demonstration purposes and to take notes each time is needed, the block should be spaced by aisles 3-4 meters wide according to limitation of the field.

TECHNOLOGY USED

1. Seed selection. Seed is selected from mature, clean and healthy cassava plants generally obtained by the rapid propagation system. From selected plants we cut stakes of 20 centimeters of lenth and after they are cut, we select the ones with adequate number of buds, without any cankers, mechanical damage, improper cut, spots or galleries in the central pyth.

2. Seed treatment. Since no selection can be applied as to find resistance to soil pathogens and insects we use a simple and inexpensive mixture of fungicides and one insecticide to protect the cuttings in the soil and to ensure a good stablishment of the crop.

3. Population. We plant 10.000 cuttings per hectare usually on the 1 x 1 pattern unless the growing habits of farmers mostly determined by the type of machinery they use do not allow rows at one meter. In all cases population is fixed.

4. Cuttings required. For those varieties planted at the ends of each block and additional eight cuttings will be required for each replication. An additional 10-15% of cuttings of each variety should be prepared so as to be able to replant each block to a full stand in those cases where germination is not complete.

   To take care of all unforseen situations, a minimum of 320 cuttings of each variety should be available for each regional trial.

5. Soil preparation. We follow the best common practice in the region. In regions where rainfall is more than 1200 mm per year and soils are heavy we make ridges. This is to avoid root rot diseases to occur. The height and width of ridges changes with the machinery available.

6. Planting position. Cuttings are planted vertically with buds facing up and trying to get at least four buds below the soil. Vertically planted position seems to be the safest way to plant cassava. In a region of adequate amount of rain and good distribution it could be the same to plant horizontally or vertically. In this case all buds with good moisture and high temperature will germinate without problems. In regions with erratic rain if cuttings are planted horizontally they may not germinate because of the following reasons:

   a. cuttings are more vulnerable through their buds which constitute the less lignified tissue easier to penetrate by any pathogen and or insect.

   b. Since soil temperature is always higher than air temperature, buds may cook and roten. When a cutting is planted vertically in a region of erratic rain one extreme of the cutting is deeper and closer to available moisture and the other extreme having some buds on the outside may permit sprouting because they do not suffer of excess heat since the cutting on the outside serves to diffuse heat.

7. Herbicide and Insecticide application. To avoid weed and insect problems the application of a mixture of herbicides and one insecticide is an standard practice. The insecticide we are using is Toxaphene DDT-40-20 without incorporation. Other insecticide, specially Aldrin, can be used if this is not available. Both at the rate of 1 gallon per hectare.

8. Insect control. Will be given only to severe attacks of Hornworm. Biological control will be prefered but when is not practical as the last resource a contact narrow spectrum insecticide as Dipterex could be used. Other insects should not be controlled to check the varietal differences.

9. Fertilization. Fertilization should be carried out according to the prevailing local practices with cassava. Since in many areas the crop is not fertilized it is also desirable, where resources permit, to use a fertilizer level based on sound agronomic recommendations in addition to the prevailing local practice. In the case of Colombia, we are only applying medium levels of fertilizer to Carimagua and Santander de Quilichao Oxisoils.

10. Visits required. A minimum of 7 visits will be required as follows:

1. To select the site and order soil preparation
2. To plant
3. After 20-25 days to replant
4. After 2 months to observe weeds and weed control if necessary.
5. After 4 months to observe diseases, insects and weeds.
6. After 7 months to observe diseases, insects and weeds.
7. To harvest the crop.

In all visits careful notes of problems and developlent are taken.

11. Collection of data

a. Soil analysis. Should be as complete as possible making a characterization of it including minor elements as Zinc, Iron, Boron, Manganese, and Cooper. A history of the field where trial is planted should be recorded too. This should include at least the following items: location, municipality, state, altitude, latitude, mean anual temperature, mean annual rainfall, soil texture, soil classification, former crop, fertilizer and pesticides used.

On each site a raing gauge must be installed so that rainfall amount and distribution can be measured.

b. Germination. Between 20 and 30 days after planting germination must be checked. Plots with less than 80% germination should be discarded. Where replanting is needed it should be performed

within 3-5 weeks of the original planting date. On cuttings nor germinated or germinated with poor vigor or symptoms of problems they should be dig out and find out the cause of the problem. Items to be checked as responsible for bad germination are·

1. Rot cutting
2. Cutting too dry
3. Cutting too thin
4. Cutting too thick
5. Cutting without roots
6. Cutting planted, upside down (inverted cutting)
7. Bad cut
8. Bad buds
9. Root insects
10. Cutting insects
11. Insects in shoots
12. Leaf insects
13. Deformed bud
14. Rot shoot
15. Difficulty in emergency (lack of vigor)
16. Cutting in a puddle
17. Others.

The total number of plants properly germinated should be recorded.

c. Prevalents Weeds. The magnitude of the infestation should be recorded indicating the type of weeds. Common and scientific names.

d. Important diseases. 23 items can be recorded according to incidence of prevalent diseases.

Common name	Scientific name
1. Cassava bacterial blight	Xanthomonas manihotis
2. Bacterial stem rot	Erwinia sp.
3. African Mosaic	Unknown causal agent
4. Common Mosaic	Caused by a virus
5. Leaf Vein Mosaic	Caused by a virus
6. Witches' Broom	Micoplasma
7. Brown leaf spot	Cercospora henningsii
8. Blight leaf spot	Cercospora vicosae
9. White leaf spot	Cercospora caribaea
10. Concentric-ring leaf spot	Phoma (Phyllosticta) sp.
11. Superelongation	Sphaceloma manihoticola
12. Cassava ash	Oidium manihotis
13. Anthracnose	Colletotrichum or Glomerella manihotis

14.	Rusts	Uromyces spp.
15.	Stem rot	Various pathogens
16.	Frog skin	Unknown causal agent (various pathogens)
17.	Root rot	Phytophthora Drechsleri
18.	Root rot	Phytium spp.
19.	Root rot	Rosellinia necatrix
20.	Root rot	Armillaria Mellea
21.	Root rot	Fomes lignosus etc.
22.	Post harvest root rot	Physiological and or pathogenic causes.
23.		
24.	Others	

e. Important pests

	Common name	Scientific name
1.	Mites	Mononychellus tanajoa
2.	Mites	Tetranychus urticae
3.	Mites	Oligonychus peruvianus
4.	Thrips	Frankliniella williamsi
5.	Thrips	Corynothrips stenopterus
6.	Thrips	Caliothrips masculinus
7.	Cassava hornworm	Erinnyis ello
8.	Shoot fly	Silba pendula
9.	Shoot fly	Carpolonchaea chalybea
10.	Fruit fly	Anastrepha pickeli
11.	Fruit fly	Anastrepha manihoti
12.	White fly	Aleurotrachelus sp.
13.	White fly	Aleurothrixus sp.
14.	White fly	Bemisia tabaci
15.	White fly	Bemisia tuberculata
16.	White fly	Trialeurodes variabilis
17.	White grubs	Larvae of coleoptera belonging to the Scarabaeidae or Cerambycidae families.
18.	Surface cutworms	Larvae of Agrotis ipsilon
19.	Climbing cutworms	Larvae of Prodenia eridania
20.	Subterranean cutworms	Various
21.	Stemborer	Coelosternus sp. (coleoptera larva).
22.	Stemborer	Lagochirus
23.	Stemborer	Phyctaenodes sp. (Lepidoptera)
24.	Scale insects	Aonidomytilus albus
25.	Scale insects	Saissetia miranda
26.	Lace bugs	Vatiga manihotae
27.	Lace bugs	Vatiga spp.
28.	Termites	Coptocermes spp.

29. Leaf cutting ants — *Atta* sp.
30. Leaf cutting ants — *Acromyrmex* sp.
31. Gall midges — Cecidomyiidae
32. Others.

f. Problems of nutritional deficiencies and toxicities

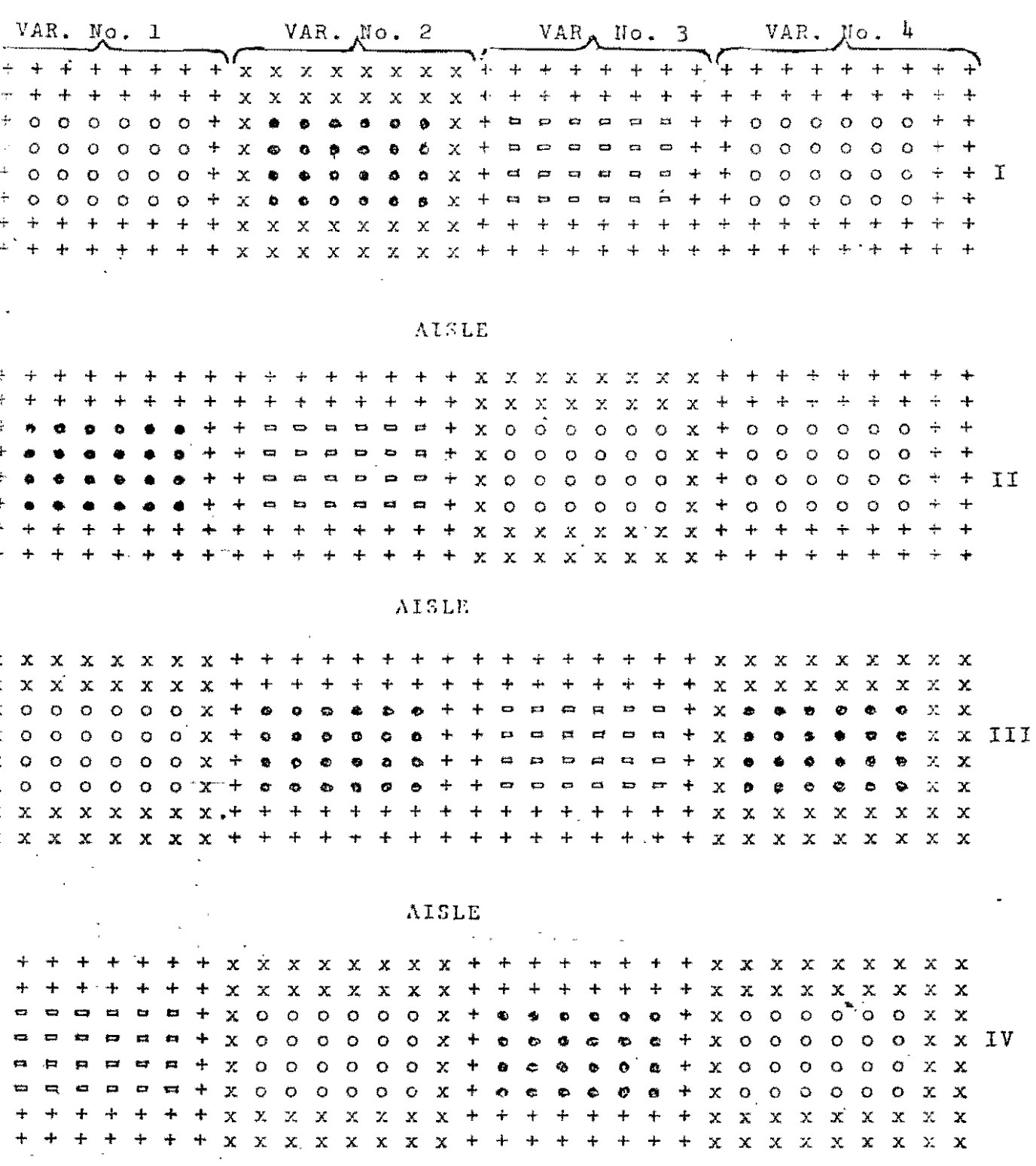
1. Nitrogen (N)
2. Phosphorus (P)
3. Potassium (K)
4. Magnesium (Mg)
5. Sulfur (S)
6. Zinc (Zn)
7. Cooper (Cu)
8. Iron (Fe)
9. Manganese (Mn)
10. Boron (B)
11. Boron Toxicity
12. Salinity and or Alkalinity
13. Others

g. Damages caused by herbicides

1. Diuron or Karmex (as preemergent)
2. Diuron or Karmex (as postemergent)
3. 2, 4-D or 2, 4, 5 T
4. Paraquat or Gramoxone
5. Butylate
6. Atrazines
7. Others.

h. Damages caused by insecticides

1. Others.



o . ● CASSAVA PLANTS TO BE HARVESTED (USEFUL PLOT)

CASSAVA PLANTS USED AS BORDER ROWS

12. Harves data. At harvesting time, it is necessary to record a lot of very important items for a better yield evaluation.

1. Total number of plants per plot
2. Total number of plants harvested in the useful are per plot because border rows are not included.
3. Number of lost plants per plot
4. Total number of roots per plot
5. Total fresh weight per plot in kgms.
6. Number of roots per plant
7. Average of root rot
8. Number of root rot
9. Root length (cm)
10. Root diameter (cm)
11. Fresh root weight in air
12. Fresh root weight in water
13. Specific density of roots
14. Percent Dry matter
15. Percent starch
16. Cooking quality
17. Yield (kg/ha)
18. Months from planting to harvest.

DAMAGE EVALUATION BY PESTS AND DISEASES IN CASSAVA

Every evaluation should be calibrated from 1 to 5 with increments of 20 to 25% for each level of damage. The absence of aparent damage will have a value of zero.

The magnitude of the damage caused by some pests and diseases is detailed so as to make evaluation easier. It is recommended to make written description in each case. This is very important because in some cases like when evaluating the Hornworm we may not see any damage at all but we can observe a lot of hornworn egs parasitized or a lot of Polystes wasps. By this mean we can plan better the kind of control more adequate since we do not want to break the biological equilibrium in as much as possible.

GUIDELINES FOR EVALUATION OF DISEASES IN CASSAVA

1. Bacterial blight

Value

1. Without visible symptoms
2. Water-soaked angular spots
3. Up to 50% defoliation
4. More than 50% defoliation, dieback and radical necrosis up to 10%.
5. Generalized dieback - more than 80% defoliation - radical root rot more than 10%.

2. Cercosporas

1. Healthy plants
2. Up to 25% defoliation
3. 26 to 50% defoliation
4. 51 to 75% defoliation
5. More than 80% defoliation

3. Superelongation

1. No damage
2. Cankers in main veins and leaves
3. Cankers in petioles and branches
4. Elongation of internodes, petioles and growing point
5. General necrosis and death of plants.

GUIDELINES FOR EVALUATION OF PESTS IN CASSAVA

1. Mononychellus Tanajoa-Mite

   1. Mites in growing points, few spots.
   2. Many mites, little spots in the growing point and terminal leaves.
   3. Growing point afected and surrounding leaves with many spots.
   4. Deformed growing point, surrounding leaves full of mites.
   5. Death growing point, general defoliation.

2. Tetranychus Urticae-Mite

   1. Few mites. Yellow spots noticeable in some leaves.
   2. Yellow spots moderately present in basal and middle part of the plant
   3. Lower leaves deformed, necrotic zones and leaves drop.
   4. Severe defoliation in middle part of the plant growing point and surrounding leaves plenty of mites and yellowish.
   5. Defoliation plant. Growing point death.

3. Thrips

   1. Little yellow dots in leaves
   2. Growing point and surrounding leaves with partial deformation and yellow dots.
   3. Intense deformation of leaves and large reduction of leaf area.
   4. Growing point completely deformed or death, no surrounding leaves present.
   5. Symptoms of witches'broom; death of growing point and surrounding lateral buds.

4. Schoot fly

   1. No damage
   2. Up to 25% if shoots affected
   3. From 26% to 50% of shoots attacked
   4. From 51 to 75% of shoots attacked
   5. From 76% to 100% of shoots attacked

5. White fly

   1. Less than 20% of leaves infested
   2. 20-40% of leaves infested
   3. 40-60% of leaves infested
   4. 60-80% of leaves infested
   5. 80-100% of leaves infested

DRY MATTER AND STARCH CONTENT DETERMINATION IN CASSAVA BY SPECIFIC GRAVITY SYSTEM

Since a significant portion of cassava production is expected to go for animal feeding and starch extraction, yield should be expressed in terms of root dry matter or starch yield, as well as root fresh yield.

Both, dry matter and starch content determinations in cassava are also very important to stablish a production potential of a given variety for industrial purposes. The varietal differences related to these factors are high as indicated by CIAT (1) consequently, the determination of these factors in different varieties acrros locations is highly recommended for regional trials.

These determinations are usually performed through laboratory methods that require a lot of time and labor.

Due to the high correlation between root specific gravity and root dry matter content, and between root specific gravity and root starch content it is possible to make fast and efficient determinations based in the specific density of roots taken through the use of a hydrostatic scale.

Wania Goncalves de Fukuda who worked under Dr. Kawano's guidance prepared a table to which we made some additions to cover a wider range. These tables are appropriate for cassava varieties harvested between 10-12 months.

To formula used for these determinations is as follows:

$$\text{Specific gravity} = \frac{\text{Fresh root weight in air (FRWA)}}{\text{(FRWA) - (Fresh root weight in water) (FRWW)}}$$

REFERENCES

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3. Grossman, J., Freitas, A.C. 1950. Determinação do Teor de Materia Seca Pelo Peso Especifico em Raizes de Mandioca. Revista Agronómica 160-162. Porto Alegre, R.S. Brasil.

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CONVERTION TABLE TO DETERMINE DRY MATTER AND STARCH PERCENT IN CASSAVA

SPECIFIC GRAVITY	% D.M.	% STARCH
1.0200	19.53	17.73
05	19.61	18.80
10	19.69	17.88
15	19.76	17.96
20	19.84	18.03
25	19.92	11.11
30	20.00	18.19
35	20.08	18.26
40	20.15	18.34
45	20.23	18.41
50	20.31	18.49
55	20.39	18.57
60	20.47	18.64
65	20.54	18.72
70	20.62	18.80
75	20.70	18.87
80	20.78	18.95
85	20.86	19.03
90	20.93	19.10
95	21.01	19.18
1.0300	21.09	19.25
05	21.17	19.33
10	21.25	19.41
15	21.33	19.48
20	21.40	19.56
25	21.48	19.64
30	21.56	19.71
35	21.64	19.79
40	21.72	19.86
45	21.79	19.94
50	21.87	20.02
55	21.95	20.09
60	22.03	20.17
65	22.11	20.25
70	22.18	20.32
75	22.26	20.40
80	22.34	20.47
85	22.42	20.55
90	22.50	20.63
95	22.57	20.70
1.0400	22.65	20.78
1.0405	22.73	20.86
10	22.81	20.93
15	22.89	21.01
20	22.97	21.09
25	23.04	21.16
30	23.12	21.24
35	23.20	21.31
40	23.28	21.39
45	23.36	21.47
50	23.43	21.54
55	23.51	21.62
60	23.59	21.70
65	23.67	21.77
70	23.75	21.85
75	23.82	21.92
80	23.90	22.00
85	23.98	22.08
90	24.06	22.15
95	24.14	22.23
1.0500	24.22	22.31
05	24.29	22.38
10	24.37	22.46
15	24.45	22.54
20	24.53	22.61
25	24.61	22.69
30	24.68	22.76
35	24.76	22.84
40	24.84	22.92
45	24.92	22.99
50	25.00	23.07
55	25.07	23.15
60	25.15	23.22
65	25.23	23.30
70	25.31	23.37
75	25.39	23.45
80	25.46	23.53
85	25.54	23.60
90	25.62	23.68
95	25.70	23.76
1.0600	25.78	23.83

SPECIFIC GRAVITY	% D.M.	% STARCH
1.0605	25.86	23.91
10	25.93	23.99
15	26.01	24.06
20	26.09	24.14
25	26.17	24.21
30	26.25	24.29
35	26.32	24.37
40	26.40	24.44
45	26.48	24.52
50	26.56	24.60
55	26.64	24.67
60	26.71	24.75
65	26.79	24.82
70	26.87	24.90
75	26.95	24.98
80	27.03	25.05
85	27.10	25.13
90	27.18	25.21
95	27.26	25.28
1.0700	27.34	25.36
05	27.42	25.44
10	27.50	25.51
15	27.57	25.59
20	27.65	25.66
25	27.73	25.74
30	27.81	25.82
35	27.89	25.89
40	27.96	25.97
45	28.04	26.05
50	28.12	26.13
55	28.20	26.20
60	28.28	26.28
65	28.35	26.36
70	28.43	26.43
75	28.51	26.51
80	28.59	26.59
85	28.67	26.66
90	28.74	26.74
95	28.82	26.81
1.0800	28.90	26.89
05	28.98	26.96
10	29.06	27.04
15	29.14	27.11
20	29.22	27.19
25	29.30	27.27
30	29.37	27.34
35	29.45	27.42
40	29.53	27.50
45	29.61	27.57
50	29.69	27.65

SPECIFIC GRAVITY	% D.M.	% STARCH
1.0855	29.77	27.72
60	19.84	27.80
65	29.92	27.88
70	30.00	27.95
75	30.08	28.03
80	30.16	28.11
85	30.23	28.18
90	30.31	28.26
95	30.39	28.34
1.0900	30.47	28.41
05	30.55	28.49
10	30.62	28.56
15	30.86	28.64
20	30.78	28.72
25	30.86	28.79
30	30.94	28.87
35	31.01	28.95
40	31.09	29.02
45	31.17	29.10
50	31.25	29.17
55	31.33	29.25
60	31.41	29.33
65	31.48	29.40
70	31.56	29.48
75	31.64	29.56
80	31.72	29.63
85	31.80	29.71
90	31.87	29.79
95	31.95	29.86
1.1000	32.03	29.94
05	32.11	30.01
10	32.19	30.09
15	32.26	30.17
20	32.34	30.24
25	32.42	30.32
30	32.50	30.40
35	32.58	30.47
40	32.65	30.55
45	32.73	30.62
50	32.81	30.70
55	32.89	30.78
60	32.97	30.85
65	33.05	30.93
70	33.12	31.01
75	33.20	31.08
80	33.28	31.16
85	33.36	31.24
90	33.44	31.31
95	33.51	31.39
1.1200	33.59	31.46

SPECIFIC GRAVITY	% D.M.	% STARCH
1.1205	35.23	33.07
10	35.31	33.14
15	35.39	33.22
20	35.46	33.30
25	35.54	33.37
30	35.62	33.45
35	35.70	33.52
40	35.77	33.60
45	35.85	33.68
50	35.93	33.75
55	36.01	33.83
60	36.09	33.91
65	36.16	33.98
70	36.24	34.06
75	36.32	34.14
80	36.40	34.21
85	36.48	34.29
90	36.55	34.36
95	36.63	34.44
1.1300	36.71	34.52
05	36.79	34.59
10	36.87	34.67
15	36.95	34.75
20	37.02	34.82
25	37.10	34.90
30	37.18	34.97
35	37.26	35.05
40	37.34	35.13
45	37.41	35.20
50	37.49	35.28
55	37.57	35.36
60	37.65	35.43
65	37.73	35.51
70	37.80	35.59
75	37.88	35.66
80	37.96	35.74
85	38.04	35.81
90	38.12	35.89
95	38.19	35.97
1.1400	38.27	36.04
05	38.35	3612
10	38.43	36.20
15	38.51	36.27
20	38.59	36.35
25	38.66	36.42
30	38.74	36.50
35	38.82	36.58
40	38.90	36.65
45	38.98	36.73
50	39.05	36.81

SPECIFIC GRAVITY	% D.M.	% STARCH
1.1455	39.13	36.88
60	39.21	36.96
65	39.29	37.04
70	39.37	37.11
75	39.44	37.19
80	39.52	37.26
85	39.60	37.34
90	39.68	37.42
95	39.76	37.49
1.1500	39.84	37.57
05	39.91	37.65
10	39.99	37.72
15	40.07	37.80
20	40.15	37.87
25	40.23	37.95
30	40.30	38.03
35	40.38	38.10
40	40.46	38.18
45	40.54	38.26
50	40.62	38.33
55	40.69	38.41
60	40.77	38.49
65	40.85	38.56
70	40.93	38.64
75	41.01	38.71
80	41.08	38.79
85	41.16	38.87
90	41.24	38.94
95	41.32	39.02
1.1600	41.40	39.10
05	41.48	39.18
10	41.55	39.25
15	41.63	39.33
20	41.71	39.41
25	41.79	39.48
30	41.87	39.56
35	41.94	39.64
40	42.02	39.71
45	42.10	39.79
50	42.18	39.86
55	42.26	39.94
60	42.33	40.02
65	42.41	40.09
70	42.49	40.17
75	42.57	40.25
80	42.65	40.32
85	42.72	40.40
90	42.80	40.47
95	42.88	40.55
1.1700	42.96	40.63

SPECIFIC GRAVITY	% D.M.	% STARCH
1.1705	43.04	40.70
10	43.12	40.78
15	43.19	40.86
20	43.27	40.93
25	43.35	41.01
30	43.43	41.08
35	43.51	41.16
40	43.59	41.24
45	43.66	41.31
50	43.74	41.39
55	43.82	41.47
60	43.90	41.54
65	43.98	41.62
70	44.06	41.70
75	44.13	41.77
80	44.21	41.84
85	44.29	41.92
90	44.37	42.00
95	44.45	42.07
1.1800	44.52	42.15
05	44.60	42.22
10	44.68	42.30
15	44.76	42.38
20	44.83	42.45
25	44.91	42.53
30	44.99	42.61
35	45.07	42.68
40	45.15	42.76
45	45.22	42.84
50	45.30	42.91
55	45.38	42.99
60	45.46	43.06
65	45.54	43.14
70	45.61	43.22
75	45.69	43.29
80	45.77	43.37
85	45.85	43.45
90	45.93	43.52
95	46.00	43.60
1.1900	46.08	43.67

METHODOLOGY OF THE TRIALS

The cassava Breeding Program is releasing each year a reasonable amount of elite material that is multiplied to be tested under regional trials by the agronomy unit.

It has been said before that the level of technology under which varieties are tested should be uniform. If some different technology is relevant to teste another trial must be planted with that technology so that a comparison can be done.

Each year the materials showing the best behavior in a given zone can be distributed to farmers after testing and evaluation. This distribution is done by the national agency through field days, after the regional trial is harvested. It is important to note that we do not promote the field day. The National Agency cooperating with us is the one that makes the invitations and we participate to give relevant information about results new finding as new measures of control of pests and diseases and cultural practices.

No variety is recommended. Farmers will take home any variety they want according to the results they have observed and to their preferences too. The economy unit makes a record of farmers to follow up on their results with the new varieties since they may test them under their own technology.

Farmers do not have better materials because the have not had enough varieties to select from, in the past. Since CIAT manages the largest collection of cassava germplasm the posibilities of finding superior varieties for each zone are very promising.

We need a good collaboration of National Agencies because they will be the ones responsible for the multiplication, promotion, technical assistance, credit and marketing. These collaboration must be on a continous basis so it will provide the benefit of promising elite materials replacing the local varieties, thereby obtaining inmediate or near-term yield and production increases.

STRATEGY TO SELECT PROMISING VARIETIES

It is relevant to briefly describe the two strategies commonly used. The first strategy, somehow conservative, would permit the testing of the same materials over three years without eliminating any material until the end of the third year. Decision over their naming as a variety would be based on excellence of performance throughout ecological zones during the three years.

The second strategy would only select for further testing those materials which have been definitely superior in that year's trial, discarding any material that does not show excellent perfomance the first time. Materials passing this rigid test would be tested during a total of three years after which they may become candidates to be named as varieties.

The main problem with the first strategy is that it accumulates large numbers of materials in a very short time. However, one would expect that with the second strategy the number of materials to be tested each year would remain more or less the same. This latter strategy would probably also lead to fewer named varieties being released.