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 ECPGR Umbellifer WG wild relatives project.

## Action report

### Taxonomical characterization of carrot wild relatives

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#### 1. Project background

As part of the Umbellifer Crops WG's workplan, a project on umbellifer wild relatives was decided, as they are precious genetic resources, but may present some problems such as being endangered *in situ*, taxonomic misidentification of *ex situ* accessions, or lack of characterization and knowledge. The present action addresses the problem of misidentification or lack of identification on the taxonomic point of view of carrot wild relatives' accessions.

The aim of this action was to collect, grow, characterize and identify taxonomically a set of carrot wild relatives' accessions from several genebanks or collections in Europe.

#### 2. Taxonomic organisation in *Daucus*

Tab 1. Adopted classification based on Small (1978) and Reduron (2007)

Species	Sub-group	subsp	var	
<b>Daucus carota L.</b>	carota	carota	carota mauritanicus	
		gadeceai		
		maritimus		
		maximus		
			sativus	sativus atrorubens
	gummifer	commutatus	commutatus tenuisectus	
		drepanensis		
			gummifer	gummifer (=ssp hispidus) fontanesii
			hispanicus	Brachycaulos Hispanicus linearis
	<b>Other <i>Daucus</i> species</b>	<i>Daucus crinitus</i> Desf. ; <i>Daucus glochidiatus</i> (Labill.) ; <i>Daucus gracilis</i> Steinh ; <i>Daucus guttatus</i> Sm ; <i>Daucus littoralis</i> Sm ; <i>Daucus montevidensis</i> Link <i>Daucus muricatus</i> L. ; <i>Daucus sahariensis</i> Murb. ; <i>Daucus bicolor</i> (=D. Broteri)...		

### **3. Material and methods**

#### 3.1 Accessions

The accessions to be identified were provided mainly by Wellesbourne Genebank (HRIGRU, UK), Agrocampus Ouest (ACO-IRHS, FRA), IPK Gatersleben (IPK, GER). Other accessions from University of Krakow (POL) and JKI (GER) were also identified for research purposes (not presented).

**Tab 2.** Number of accessions characterized in 2012-2013

	Source	Existing identification	No identification	Control	Total
2012	HRIGRU IPK ACO-IRHS	10 3 5	10 9	10	47
2013	HRIGRU ACO-IRHS	13 10	37	8	68
total		41	56	18	<b>115</b>

#### 3.2 Characterization

Two series were studied in 2011-2012 and 2012-2013.

The seeds were planted in trays in greenhouse in September. The accessions were characterized first at the rosette stage (Fig 1A).

After sufficient development, the plants were vernalized in cold greenhouse, in order to be able to observe the blooming stage and avoid variations due to annual/biannual habits.

In March-April the following year, 8 plants per accession were transplanted in the field under irrigated conditions. The plants were observed and characterized in mid-july, at the blooming stage (Fig 1B).

General habit, basal leaves, stem type, umbel, bracts, and fruits (when present) were observed.



**Fig 1.** Observation of accessions at the rosette stage (A) and the blooming stage (B).

#### 4. Results

As expected, the observations showed an important variation in wild carrot. Most of accessions were quite homogenous and some were uneasy to identify as they were intermediate or a mix between taxa. The identification was based on the observations and comparison with control accessions well identified. (Fig 2).

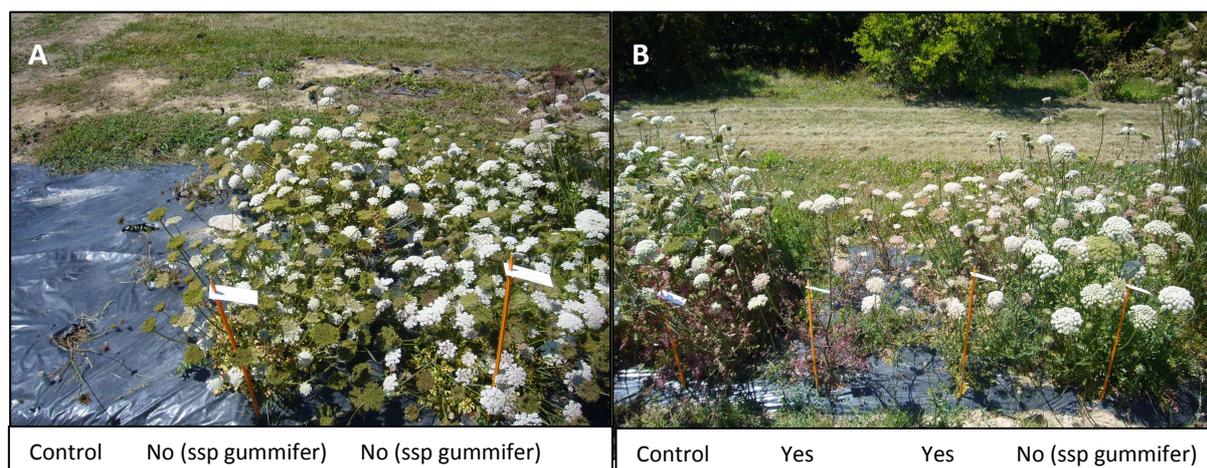


Fig 2. Comparison of accessions with control for ssp *gadeceai* (A) and ssp *commutatus* (B).

We report here the synthesis of the taxonomical identification. The detailed results are presented in annex.

Tab 3. Identification results for the 2012 batch

ID Accession	Nb Acc.	ID Correct	ID Not correct	Proposed new ID when not correct or absent
<i>D.c. ssp gadeceai</i>	2		2	<i>gummifer; gummiferXgadeceai</i>
<i>D.c. ssp maritimus</i>	1		1	<i>Cultivated or wildXCultivated</i>
<i>D.c. major</i>	1		1	<i>var carota</i>
<i>D.c. maximus</i>	3		3	<i>var carota (2); gummifer (1)</i>
<i>D.c. maxima</i>	1		1	<i>var carota</i>
<i>D.c. ssp gummifer</i>	3	2	1	<i>carotaXgummifer</i>
<i>Ssp gummifer var fontanesii</i>	3	3		
<i>D.c. ssp commutatus</i>	3	2	1	<i>gummifer var fontanesii?</i>
<i>D.c. ssp gingidium</i>	1		1	<i>gummifer</i>
<i>D. azoricus Franco</i>	1		1	<i>Ssp gummifer</i>
<i>Binyomina 1 wild/sativus?</i>	1	-	-	<i>Ssp sativus</i>
<i>Daucus sp</i>	2	-	-	<i>var mauritanicus (2)</i>
<i>D.c.</i>	7	-	-	<i>var carota (6); ssp gummifer (1)</i>
<i>D. carota (no ssp)</i>	2	-	-	<i>var carota (2)</i>
<i>D.c. L subsp?</i>	9	-	-	<i>Subgroup gummifer(6), intermediate ssp carota X ssp gummifer (3)</i>
<i>D. montevidensis</i>	1	1	-	<i>D. pusillus (synonym)</i>
<i>D. guttatus, D.c. libanotifolia, D.c. hispidifolius</i>	3	-	-	To be checked again
total	44	8	12	Missing ID : 21

**Tab 4.** Identification results for the 2013 batch

ID Accession	Nb Acc.	ID Correct	ID Not correct	Proposed new ID when not correct or absent
<i>D.c. ssp drepanensis</i>	1		1	<i>Ssp carota var carota</i>
<i>D.c. ssp commutatus</i>	2	2		<i>Ssp commutatus var tenuisectus</i>
<i>D.c. ssp gummifer</i>	4	2	2	<i>Ssp gummifer var fontanesii (1), intermediate ssp carota X ssp gummifer (1)</i>
<i>D.c. ssp gingidium</i>	1		1	<i>Ssp commutatus</i>
<i>Ssp carota</i>	7	5	2	<i>Intermediate gummifer X ssp carota (1), ssp gumifer var fontanesii (1)</i>
<i>D.c. ssp maritimus</i>	2	1	1	<i>Ssp gummifer var gummifer</i>
<i>D. carota (no ssp)</i>	32	-	-	<i>Ssp carota var carota (16) Xsp carota (1) Ssp commutatus (1) Ssp gummifer var fontanesii (3) Intermediate ssp carota X ssp gadeceai (1) Intermediate ssp gummifer X carota (1) Ssp sativus (5) cultivated Hybrid cultivated X wild (2) ssp sativus cultivated or hybrid (2) Non identified (5)</i>
<i>D. duriens</i> Lange	1	1		
<i>D. littoralis</i>	1	1		
total	51	12	7	Missing ID : 32

The main confusions were within *Daucus carota* L. Most of accessions were correctly separated between ssp carota and ssp gummifer, but with confusion at the variety level. About 50 accessions without identification were identified. Despite their classification as wild type, 6 accessions were indeed of the cultivated type, while 5 corresponded to hybrids between the cultivated and wild types. However, different types of classifications can lead to various identifications between genebanks. Traceability of identifications in database is an important challenge.

## **5. Conclusion**

There is a high phenotypic variation in the genera *Daucus*, and within *Daucus carota* L. This variation along with the environmental plasticity makes the taxonomical identification difficult. Observations in similar agronomic conditions and comparison with reference accessions facilitate such identification. Plant and organ precise measurements and genotyping would be informative in this regard.

A mutualised effort is still needed to reduce the rate of lacking identification or misidentification, in order to allow the valorisation of these important resources for the species knowledge and improvement.

## **Litterature**

**Reduron, J.P.** (2007). Ombellifères de France - Tome II, *Société botanique du Centre-Ouest*. 345p.

**Small, E.** (1978). A numerical taxonomic analysis of the *Daucus carota* complex. *Canadian Journal of Botany* **56**: 248-276

## Appendix - Characterization and identification results

### 2013 batch

Source	ID	SP	Taxon	Proposed new identification	Homogeneity	Observations
HRIGRU	6668	D. carota	drepanensis?	ssp carota var carota	Homogenous	halophylus type, umbel in nest,
HRIGRU	7999	D. carota	commutatus	ssp commutatus var tenuisectus	average homogeneity	Typical foliage but finely cut (=tenuisectus)
HRIGRU	7386	D. carota	commutatus?	ssp commutatus var tenuisectus	homogenous	Foliage finely cut (=tenuisectus)
HRIGRU	7387	D. carota	gummifer	ssp gummifer var gummifer	average homogeneity	Glossy foliage fleshy, + / - cut. Bracts narrow, lanceolate, linear. Fruiting umbel flat . Port stocky, hairy plant. Fruit spines up (= gummifer). 1 flowering plant
HRIGRU	8706	D. carota	gummifer?	ssp gummifer var fontanesii	homogenous	Habit gummifer, stocky, hairy stem. Broadleaf fleshy matt. Bracts narrow, radiating spines + / - welded.
HRIGRU	8710	D. carota	gummifer?	intermediaire carota x gummifer	homogenous	Habit carota except one plant. Divided foliage, slightly clear. Leaves slightly fleshy and broad base (= intermediate). Stems hairy. Bracts narrow somewhat fleshy. Umbel beaming, rather nest. Spines radiating rights not confluent.
HRIGRU	8713	D. carota	gummifer?	ssp gummifer	average homogeneity	Slightly glossy leaves, broad, fleshy. Hairy stems, zig-zag. Bracts lanceolate + / - elongated. Umbels radiant rigid rays, but no fruit.
HRIGRU	8728	D. carota	gingidium?	ssp commutatus	homogenous	Rosette habit commutatus. Leaves fleshy, glossy, cut as commutatus. Fruiting umbel leathery very hard. Short spines facing up.

HRIGRU	7996	D. carota	maritimus	ssp gummifer var gummifer	very homogenous	Robust vigorous upright plant (thick stem glabrous). Bracts lanceolate + / - elongated. Fairly rigid rays .. Broad foliage, almost dull.
HRIGRU	7385	D. carota	carota	ssp carota var carota	homogenous	Habit carota high, slender, leafy little. Base cut sheets, medium width, matte, just fleshy. Soft rays. Bracts linear flexible. Radiating spines, thin, straight, free. Radiant flowers.
HRIGRU	7876	D. carota	carota	intermediaire ssp gummifer x ssp carota	homogenous	Habit gummifer stocky. Side rods ascending. Base leaves much cut, glossy, lanceolate lobes, non-fleshy. Bracts FL1 thickish, lanceolate, + / - elongated. Bracts FL2 elongated flexible. Rays + / - rigid. Radiant flowers. Fruiting umbels FL1 closed in nest. Many spines, long, straight, free.
HRIGRU	6674	D. carota		intermediaire ssp carota x ssp gadeceai	homogenous	Vigor problem: only 2 plants, foliage disappeared except base. Hybrid habit carota x gadeceai. Highly branched plants. Leaves lanceolate lobes basis, rather fleshy. Small umbel. Bracts flexible linear. Soft rays. Fruiting umbel nest. Spines numerous, rights, free, long, radiant.
HRIGRU	6678	D. carota		ssp carota var carota	very homogenous	Habit carota. Port slender but sturdy. Basal leaves cut + / - lanceolate, dull, not fleshy. Bracts linear flexible. Soft rays. Flowers radiating medium. Fruiting umbel nest. Spines medium length, radiant, free, straight.
HRIGRU	6679	D. carota		ssp carota var carota	homogenous	Habit carota but slender maritimus trend. Cut basal leaves lanceolate, slightly fleshy, dull. Soft rays. Bracts narrow flexible linear. Flowers slightly radiating. Spines average number, average length, straight, radiant, free. Umbel nest.
HRIGRU	6680	D. carota		ssp carota var carota	homogenous	Habit carota slender. Basal leaves slightly fleshy, dull, cut, lanceolate. Soft rays. Central yellow flower! Bracts linear flexible. Fruiting umbel in nest. Long spines radiating straight free.
HRIGRU	7192	D. carota		intermediate ssp gummifer x ssp carota?	heterogenous	Hairy stem hispid. Basal leaves shiny to dull, cut into very lobed leaf oak type lanceolate segments. Soft rays. Bracts lanceolate to linear. Radiant flowers. no green fruit
HRIGRU	7194	D. carota		ssp carota var sativus		Dead plants. Early bolting at plantlet stage. Cultivated type , pink tuberous root at plantlet stage.

HRIGRU	<b>7877</b>	D. carota		ssp carota var carota	average homogeneity	habit carota. Basal leaves not fleshy, dull to somewhat shiny, lanceolate lobes. Soft rays. Bracts linear flexible. Flowers radiating medium. Fruiting umbel in nest. Spines radiating straight free
HRIGRU	<b>8692</b>	D. carota		ssp gummifer var fontanesii	homogenous	Habit gummifer stocky, rigid branched rays. Bracts linear flexible wide. Umbel FL1 flat at the top, FL2 in cup. Prickles rights medium length, rather stocky, radiant, slightly fused at base. Homogeneous except plant height.
HRIGRU	<b>8708</b>	D. carota		ssp gummifer var fontanesii	average homogeneity	Habit gummifer, robust, stocky, branched. Broad foliage, fleshy, slightly glossy. Rigid rays. FL1 fleshy bracts, + / - long and lanceolate. Bracts FL2 linear and flexible. Umbel dome. Flowers radiating significantly. Fruiting umbel flat and compact or nest. Spines straight, medium length, rather stocky, radiant, free. Homogeneous except size.
HRIGRU	<b>8711</b>	D. carota		ssp gummifer var fontanesii / var gummifer	homogenous	Habit gummifer, robust, stocky, spreading branches. Broad-leaved (oval), fleshy, glossy. Rigid rays. Bracts fleshy, ovate to + / - lanceolate. Umbel dome. Flowers a little radiant. FL1 and FL2 fruiting umbel flat or cut. Spines short, stocky, straight, free. Homogeneous except size.
HRIGRU	<b>8729</b>	D. carota		ssp commutatus		Commutatus foliage type. Rosette stage, foliage only.
HRIGRU	<b>9190</b>	D. carota		ssp carota var carota		Habit carota slender. Not fleshy foliage, matte, cut, lanceolate. Soft rays. Bracts linear flexible. Flowers radiating medium. Fruiting umbel nest. spines radiating.
HRIGRU	<b>9198</b>	D. carota		ssp carota var carota	very homogenous	Habit carota slender, little leaves, shape of maritimus ssp. Basal leaves somewhat fleshy, dull, cut, lanceolate. Upper leaves divided into linear segments. Soft rays. Bracts linear flexible. Weakly radiating flowers. Fruiting umbel nest. Spines not developed.
HRIGRU	<b>9246</b>	D. carota		ssp carota var carota	heterogenous height	Port carota vigorous, robust. Stem hispid. Basal leaves somewhat fleshy, dull, cut, lanceolate, obales lobes. Bracts linear flexible. Soft rays. . Flowers radiating medium. Fruiting umbel nest. Many straight spines. Good homogeneity except for size. 2 dead plants (health pb?).

HRIGRU	9257	D. carota		ssp carota var carota	heterogenous height	Habit carota, vigorous. Basal leaves somewhat fleshy, dull, very divided, lanceolate. Bracts linear flexible. Flexible somewhat rigid rays. Flowers slightly radiating to radiating significantly. Floral stage, no green fruit. Good homogeneity except for size. Some poorly developed plants (bp health?).
HRIGRU	9258	D. carota		ssp carota var carota		Unrated, sickly stunted plants (health pb?).
HRIGRU	9259	D. carota		ssp carota var carota	very homogenous	Port carota strong. Basal leaves not fleshy, dull, very divided, lanceolate. Bracts narrowly linear flexible. Soft rays. Flowers radiating significantly. 2 plants at floral stage, no fruit.
HRIGRU	9265	D. carota		ssp carota var carota	homogenous	Habit carota, average vigor. Basal leaves not fleshy, dull, very divided, lanceolate. Bracts linear flexible. Soft rays. Radiant flowers. Spines straight, radiant, free.
HRIGRU	9276	D. carota		ssp carota var carota		Plants not well developed. Basal leaves not fleshy, dull, divided, lanceolate. Bracts linear flexible. Soft rays. Radiant flowers. No young fruit.
HRIGRU	9280	D. carota		ssp carota var carota		Only one correct plant, bud stage.
HRIGRU	9287	D. carota		ssp carota var carota		Unrated. Plants not properly developed.
HRIGRU	9293	D. carota		ssp carota var sativus		Cultivated type. Yellow root.
HRIGRU	1040 7	D. carota		??		Wild or hybrid wild X cultivated? Less vigorous plants, early, fruit stage. Bracts linear elongated terminal segments. Umbel nest. Rigid rays. Spines straight, few, medium length, free.
HRIGRU	1041 0	D. carota		ssp carota var sativus		The cultivated type. Violet roots and anthocyanin plant. Umbel FL1 flat, appearance ball.
HRIGRU	1048 6	D. carota		ssp carota var sativus		Cultivated type, violet roots. Plants not well developed except one. Umbel very curved, floral stage without central flower.

HRIGRU	1049 1	D. carota		hybride sauvage X cultivé?		Seedling stage: tuberous roots slightly white to purple. Robust plants. Bracts linear flexible. Soft rays. Umbel FL1 closed nest with rigid rays. Free spines radiating, thin, narrow.
HRIGRU	1049 3	D. carota		ssp carota var sativus		Cultivated type. Orange root Paris Market Type (at seedling stage). Highly branched vigorous plant. Leaves cultivated type with elongated segments. Umbel cultivated type.
HRIGRU	1049 4	D. carota		var sativus or hybrid cultivated X wild?		Leaves and umbel cultivated type. At the seedling stage = white tuberous root enough (hybrid cultivated X wild?).
HRIGRU	1049 7	D. carota		ND		Plants badly developped. Plant rosette. Unrated.
HRIGRU	1049 8	D. carota		ND		Dead plants.
HRIGRU	1116 2	D. carota		ND		5 dieback plants. Root rot.
HRIGRU	1116 5	D. carota		ssp carota var carota		1 carota type vigorous plant . Other plants poorly developed.
HRIGRU	1396 5	Daucus sp		var sativus or hybrid cultivated X wild?		Leaves and umbel (very curved), cultivated type. At the seedling stage = white quite tuberous root (hybrid cultivated X wild?).
HRIGRU	1396 6	Daucus sp		ssp carota var carota	homogenous	Habit carota, medium vigor. Basal leaves not fleshy, dull, divided, lanceolate. Bracts linear flexible. Soft rays. Umbel in cup with young fruits. Spines straight, radiant, free, fine.
HRIGRU	1396 7	Daucus sp		??, Mixture	heterogenous	Habit plants : 1 carota, 1 mauritanicus, 5 hybrids cultivated X wild. At seedling stage : not tuberous and white roots.
HRIGRU	1396 8	Daucus sp		ssp carota		Vigor medium. 1 single plant well developed, others poorly developped.

HRIGRU	1396 9	Daucus sp		hybrid wild X cultivated	homogeneity average	Looking carota but leaves and umbels (separate umbels) of the cultivated type. Basal leaves ovate to lanceolate, cut, matt, not fleshy. Soft rays. Bracts linear flexible. Red central flower frequent, sometimes in group. Median mixed foliage, cultivated / carota / intermediary types. Good homogeneity except size and vigor.
HRIGRU	7188	Daucus duriena Lange		Daucus duriena Lange	homogenous	Very early, so dessicated stage. Identity confirmed by fruits.
HRIGRU	7997	Daucus littoralis		Daucus littoralis	homogenous	Very early, fruit stage in greenhouse, not transplanted to the field. Correct identity from fruits.
ACO/IRHS	780	D. carota	drepanensis	ssp drepanensis	homogenous	dwarf plant remaining at ground
ACO/IRHS	786	D. carota	commutatus	ssp commutatus	very homogenous	Typical commutatus : habit and cutout leaf
ACO/IRHS	730	D. carota	gummifer	intermediaire gummifer x carota	average homogeneity	Umbels in nest (majority), dome and flat. Bracts narrow. Spines straight, not confluent as of carota.
ACO/IRHS	790	D. carota	fontanesii	var fontanesii	average homogeneity	Plant var gummifer but not hooked fruits. 1 plant in bloom. Hairy stem but variable. Plant not robust and small (30cm). Broad foliage, fleshy. Bracts lanceolate elongated. Small flat umbels 5-6cm. Spines not confluent, straight.
ACO/IRHS	770	D. carota	hispanicus-fontanesii	var fontanesii	homogenous	Very hairy stem, zig-zag. Broad and fleshy foliage. Umbel bud stage. Bracts lanceolate (ogive).
ACO/IRHS	775	D. carota	brachycaulos	var brachycaulos	homogenous	Brachycaulos tall (65cm). Weakly hairy, stem zig-zag. Wide shiny fleshy leaf. Bracts lanceolate + / - elongated. Umbel bud stage. Leaves more divided than hispanicus.
ACO/IRHS	706	D. carota	maritimus	ssp maritimus	homogenous	Narrow foliage. Bracts linear. Flowers almost non-radiating. Umbels in nest or flat. Green but quite advanced fruits.
ACO/IRHS	773	D. carota	maritimus grande	ssp maritimus vigoureux, 1 plante hybride maritimus-brachycaulos	heterogenous	Allure maritimus. Foliage with narrow segments except one plant hybridized with gummifer. Basal leaves fleshy and shiny.
ACO/IRHS	702	D. carota	carota	ssp carota var carota	homogenous	Leaves not or somewhat fleshy. Habit carota. Soft rays. Bracts linear. Flowers a little radiant. Fruiting umbels nest. Many spines radiating, straight, free.
ACO/IRHS	896	D. carota	var. mauritanicus (L.) Spreng	var mauritanicus		Var mauritanicus with a trend vigourous carota. Basal leaves segments with average width to wide. Bracts linear flexible. Fruiting umbels in closed nest. Small fruits with few spines, straight, free, radiant, moderately long.

ACO/IRHS	879	D. carota	carota	var carota	homogenous	var carota vigorous. Leaves medium to large divisions. Flexible bracts linear, dull. Soft rays. Great fruit. Spines fine, straight, radiant, long, free.
ACO/IRHS	880	D. carota	carota	var carota	homogenous	var carota average force. Habit carota. Basal leaves well cut, medium width (to a little large), dull, just fleshy. Bracts flexible linear. Soft rays. Radiant flowers.
ACO/IRHS	886	D. carota	carota	var carota	very homogenous	Habit carota slender, little leafy on top. Basal leaves well cut, medium width, dull, just fleshy.
ACO/IRHS	887	D. carota	carota	var carota	homogenous	Habit carota. Little leafy on top. Basal leaves base well cut, medium, dull, non-fleshy. Bracts linear flexible. Soft rays. Radiant flowers. Umbel nest. Spines straight, medium length, radiant.

### 2012 batch

SOURCE	ID	TAXON	Proposed new Identification	Observations
ACO/IRHS	805	gadecaei	<i>ssp gadecaei</i>	Very good compliance field. Plant plagiotropic outwardly. Pinkish inflorescences. 4 plants.
ACO/IRHS	730	gummifer	<i>ssp gummifer var gummifer</i>	Homogeneous. Very good compliance field. Height 55 cm.
ACO/IRHS	798		<i>intermédiaire ssp carota X var fontanesii</i>	Relatively heterogeneous (also in field). Leaves type carota and fumbels fontanesii kind . Height 50-70 cm. 6 plants.
ACO/IRHS	895		<i>ssp gummifer var fontanesii</i>	Fontanesii typical. Vigorous broad foliage, gummifer mediterannean. Good field compliance. Homogeneous. Height 70-100 cm.
ACO/IRHS	898		<i>ssp gummifer var fontanesii</i>	Good field compliance. Fontanesii less typical, with influences carota? Heterogeneous. Height 70 cm.
ACO/IRHS	786	g. commutatus	<i>ssp commutatus</i>	Typical
ACO/IRHS	706	c. maritimus	<i>ssp maritimus</i>	Typical. Very good compliance field. Homogeneous.

ACO/IRHS	702	carota	<i>ssp carota var carota</i>	Compliance field. Height 120 cm.
ACO/IRHS	704	carota	<i>ssp carota var carota</i>	Meanest than in the field. Plant later or problem vernalization. Young inflorescences yellowish. Height 80-100 cm.
ACO/IRHS	891	<b>Daucus carota L. subsp. ?</b>	<i>subgroup gummifer</i>	Heterogeneous. Broad or and narrow linear leaves. Height 50-70 cm.
ACO/IRHS	892	<b>Daucus carota L. subsp. ?</b>	<i>subgroup gummifer</i>	Heterogeneous. Fleshy leaves or linear. Height 60-80 cm.
ACO/IRHS	893	<b>Daucus carota L. subsp. ?</b>	<i>subgroup gummifer</i>	Heterogeneous. Non-compliant field. 2 commutatus type plants. Other plants with linear or fleshy leaves.
ACO/IRHS	894	<b>Daucus carota L. subsp. ?</b>	<i>subgroup gummifer</i>	Non-compliant to the field: dwarf (15cm) drepanensis type in the original ground while here height 40-60 cm. Relatively homogeneous . No linear leaves.
ACO/IRHS	897	<b>Daucus carota L. subsp. ?</b>	<i>subgroup gummifer</i>	Consistent field. Very homogeneous. Dark green foliage. Height 55 cm.
ACO/IRHS	900	<b>subgr. carota</b>	<i>mix sg carota - sg gummifer</i>	Heterogeneous. Non-consistent field. 1 carota plant small and 2 plants small gummifer. Low and robust plants. Broad and linear leaves. Height 35 cm.
ACO/IRHS	901	<b>Daucus carota L. subsp. ?</b>	<i>Intermediate ssp carotaXgummifer</i>	Land consistent (but larger on land). Umbels half nest. Height 70-110 cm.
ACO/IRHS	902	<b>Daucus carota L. subsp. ?</b>	<i>subgroup gummifer</i>	No consistent with field (height 30 cm) for height (height 85cm.). Robust and large plants.
ACO/IRHS	903	<b>Daucus carota L. subsp. ?</b>	<i>Intermediate ssp carotaXgummifer</i>	Consistent field but stronger. Intermediate carota gummifer for leaves and umbels. Central flower very marked.

ACO/IRHS	782	c. mauritanicus	<i>ssp carota var mauritanicus</i>	Compliant. Narrow leaves. Umbels wide (16-16-16cm diameter). Height 70-100 cm.
ACO/IRHS	890	<b>subsp. maximus (Desf.) Ball</b>	<i>ssp carota var mauritanicus</i>	Height 60-100 cm. Diameter umbels 11-11 cm.
ACO/IRHS	896	<b>subsp. maximus (Dasf.) Ball</b>	<i>ssp carota var mauritanicus</i>	Very good compliance. Mauritanicus strong (close maximus). Coarse foliage. Height 85-115 cm. 16cm diameter umbels.
ACO/IRHS	814	azoricus	<i>To be checked again</i>	
ACO/IRHS	656	muricatus	<i>Daucus muricatus</i>	Typical: unequal rays, plant very early, large fruits.
ACO/IRHS	899		<i>ssp gummifer var fontanesii</i>	Very good compliance field. Wide foliage. Flower plant multiple. Near N06.
HRIGRU	9202	ssp. gadeceai (Rouy & Camus) Heywood	<i>intermediate ssp gummifer X gadeceai</i>	Plant taller and more vigorous than gadeceai plagiotropic inflorescences
HRIGRU	7161	ssp. gummifer Hooker fil.	<i>Intermediate ssp carotaXgummifer</i>	High ramification Slender plant Carota type leaves
HRIGRU	7159	gingidium	<i>ssp gummifer var gummifer</i>	Plant height 30cm Stocky plant Term gingidium to be revised
HRIGRU	9201	commutatus	<i>ssp gummifer (var fontanesii?)</i>	plant height 55-70cm big umbels 15 cm diameter not commutatus type leaves vigourous plants
HRIGRU	7388	ssp. maritimus (Lam.) Batt.	<i>ssp sativus</i>	Cultivated type leaves and umbels Plant height 110cm

HRIGRU	8001	Daucus sp	<i>ssp carota var carota</i>	plant height 70cm
HRIGRU	8002	Daucus sp	<i>ssp carota (var mauritanicus?)</i>	Plant height 105cm Umbel diam 14cm Homogenous origin?
HRIGRU	8716	D.c.	<i>ssp gummifer var gummifer</i>	very typical plantheight 30cm Dense and domed umbels
HRIGRU	9226	D.c.	<i>ssp carota var carota</i>	Pink umbels Plant height 75-100cm original
HRIGRU	9270	D.c.	<i>ssp carota var carota</i>	plants in bad shape
HRIGRU	10495	Binyomina N°1 wild/sativus?	<i>ssp sativus</i>	Plant height 85-110cm 2 non bolting / 8
HRIGRU	12423	Daucus sp	<i>ssp carota var carota</i>	Plant height 90cm
HRIGRU	13208	D.c.	<i>ssp carota var carota</i>	1 cultivated type plant pollution? plant height 85cm heterogenous
HRIGRU	13962	Daucus sp	<i>ssp carota (var mauritanicus?)</i>	similar to 8002 bad sanitary status plant height 90-100
HRIGRU	13963	Daucus sp	<i>ssp carota var carota</i>	Height 135cm. Umbel diameter 13cm.
HRIGRU	13964	Daucus sp	<i>ssp carota var carota</i>	bad sanitary status

HRIGRU	9218	ssp. maximus (Desf.) Ball	<i>ssp carota var carota</i>	plant height 70cm
HRIGRU	6667	azoricus Franco	<i>ssp gummifer (var fontanesii? halophilus?)</i>	Not azoricus Pinkish umbels
HRIGRU	7189	D. hispidifolius Clos.	<i>to be checked again</i>	Homogenous. To be checked again for identification.
HRIGRU	7190	capillifolius	<i>Daucus capillifolius</i>	typical
IPK	DAU 217	D.c. major	<i>ssp carota var carota</i>	Frail plant. Little foliage, upright.
IPK	DAU 257	D.c. maximus	<i>ssp carota var carota</i>	Light green leaves. Carota with cultured influence? Height 90 cm.