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INSTITUTUM AGRONOMICUM "DR.PETRU GROZA" CLUJ-NAPOCA/ROMANIA/
NOTULAE BOTANICAE HORTI AGROBOTANICI CLUJ., 1981, XI.

Undergraduate student report

OBSERVATIONS REGARDING MERICARP AND SEEDLING VARIABILITY BY DAUCUS CAROTA L. SSP. CAROTA

Observations regarding mericarp and seedling variability by Daucus carota L. ssp. carota. Not. Bot. Hort. Agrobot. Cluj, XI, Related with possible evolutionary connections between the different populations of wild and cultivated carrot (Daucus carota L. ssp. carota et ssp. sativa /Hoffm./ Arc.), mericarp and seedling variability by two different groups of wild carrot populations collected in Transylvania (Eastern Europe) and Germany (Central Europe) have been studied. A marked variability was observed in coloration of the hypocotyl region of the seedlings. Seed characters were not sufficient for the detection of a variability pattern. A marked variation pattern was observed in juvenile stage: populations from Germany or that from carrot growing regions of Transylvania developed more vigurous roots. This indicate the existence of a possible evolutionary pressure acting on the wild populations through gene flow from the cultivated taxa.

Index words: Daucus carota ssp. carota; mericarp, seedling, variability, evolution.

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The descent and development of modern carrot cultivars started in Europe in the 12th century, when purple and yellow-rooted carrot material was brought from Afghanistan to Spain, and continued mainly in the Netherlands when the first modern populations with orange, yellow and

white roots emerged (BANGA 1963,1976). BRANDENBOURG has recently pointed out that the occurence of some semiwild carrots could play some, yet indistinct role, in the development of modern cultivars. Independently from this opinion, an undergraduate student team (C. Voloacă, P. Bausmerth, V. Vancea, Maria Velciov, Gh. Pop, C. Adrişca) under the guidance of conf. dr. I. Moldovan and res. sci. dr. A.T. Szabó started an investigation in order to detect the occurance of wild carrot populations, influenced by possible gene flow from cultivated taxa.

In Romania Daucus carota L. ssp. sativa (Hoffm.) Arc. is an important cultivated plant (I. CEAUŞESCU et al. 1980, INDREA et col. 1979). Daucus carota ssp. carota, the wild carrot is one of the most commonest weeds, especially in clover fields (Trifolio-Medicaginion sativae Balázs 1944), road sides and eroded slopes (Dauco-Melilotion Görs 1966). This populations are detrimental for seed quality of the cultivated varieties (BANGA 1976). In the same time wild populations are highly variable.

Tab. 1.

The variability of wild populations as reflected in some botanical monographs.

	TODOR 1958	SOÓ 1966	HEYWOOD 1972
ssp.	2 (+ 1)	2 (+ 1)	12
var.	-	3	-
forma	9	25	-

The morphologial variability of the taxon is reflected differently by different botanical monographs (Table 1.). A modern biosystematic study of the variability was presented recently by SMALL (1978) for ssp. carota, details regarding the systematics and nomenclature of ssp. sativa was reviewed by PARKER 1978. Problems regarding the biology of the wild populations (germination, perenniality, spreading etc.) was presented by DALE 1974, 1979.

Matherial and method

Measurments have been made on samples collected from wild in Transylvania or obtained through seed exchange from German Democratic Republic and German Federal Republic (Table 2.). Characters measured:

01 mericarp characters - 01.01 length ; 01.02 width; 01.03 appendix number in side row; 01.04 appendix length; 01.05 wight of 1000 mericarps; 02 seedling characters; 02.01 root length; 02.02 hypocotyl length; 02.03 cotyledon length; 02.04 cotyledon width; 02.05 first leaf length with petiole; 02.06 width of the first leaf blade; 03 juvenileplant characters: 02.07 root length; 02.08 root width; 03.03 length of the lamina of the basal leaf; 03.04 width of the lamina of basal leaf. (Metric values in mm).

Seed characters were measured directly on the sample collected or obtained by seed exchange respectively. Seed samples were sown thick, in boxes of 80 mm depth filled with garden soil on 1 March 1980. Samples germinated in these boxes at about 20° C , seedlings were measured three weeks after germination. Seedlings reserved for further studies are left in boxes in xerophytic conditions during the summer and harvested for measurements in late autumn.

In the experimental conditions created for this study, plants remained in a juvenile stage, proving the opinion formulated by DALE 1974: in unfavourable conditions wild carrot remains in a vegetative stage up to 3-4 years.

The studied seed samples, seedlings and juvenile plants are preserved in the Herbarium of the Agrobotanic Garden (HCLA nr. 26.919-26.929.

Results and discussions

The variability of the measured mericarp characters are presented in Table 2.

Results indicate that mericarp characters studied in our random samples were not suitable to detect any marked variability pattern. Mericarps of Daucus carota are highly variable in dependence of their place in the umbrella, the place of the umbrella on the plant and the time of fruit maturation (DALE 1979).

In the case of seedlings and juvenil plants some of the studied characters revealed peculiarities which seems to be worth of further studies (Table 3.).

Hypocotyl was considerably longer by the populations originated from Central Europe as compared with East European (Transylvanian) ones. A striking variability was also observed in the case of the intensity of purple coloration of the hypocotyl region of the seedlings.

Tab. 2.

The variability of the analyzed mericarp characters.

Nr.	Sample	Mericarp characters 01	02	03	04	05
	A					
1.	Nadeș, distr. Mureș, 292/78	2,90	2,10	18,3	1,08	1,62
2.	Lisa, distr. Sibiu, 109/78	2,30	1,18	18,3	0,98	1,20
3.	Olosig, distr. Bihor, 185/78	1,95	1,03	17,5	0,52	1,21
4.	Chinteni, distr. Cluj, 161/79	3,06	1,89	12,0	0,97	1,04
5.	Beiuș, distr. Cluj, 264/79	1,83	0,94	0,8	-	0,57
6.	Săvădisla, distr. Cluj, 295/79	1,98	1,19	18,0	1,03	0,69
	$\bar{x}_{1-6}$	2,34	1,39	16,80	0,92	1,05
	B					
7.	Halle Neustadt, 157/78	2,23	1,38	13,33	0,73	0,86
8.	Gera. 155/78	2,37	1,34	12,70	1,10	0,70
9.	Eberswalde. 154/78	2,16	1,32	13,00	0,75	0,72
10.	Steuden, Saalkreis, 161/78	3,19	1,57	12,28	1,11	1,23
11.	Halle Saale, 156/78	2,37	1,12	-	-	0,91
12.	Nessen. 158/78	2,26	1,02	13,90	1,14	0,92
13.	Zerbst. 163/78	2,51	1,61	-	-	1,04
14.	Süsser See Eisleben, 162/78	2,33	1,04	12,70	1,18	0,83
15.	Sandersleben, 159/78	2,35	1,21	16,10	0,95	0,80
16.	Sangerhausen. 160/78	2,01	1,20	13,90	1,32	0,72
17.	Bitterfeld. 153/78	2,00	1,11	-	-	0,68
	$\bar{x}_{7-17}$	2,34	1,27	13,49	1,04	0,86
	C					
18.	Giesen	2,23	1,53	22,50	0,63	0,82
19.	Frankfurt, 1812/78	2,51	1,56	12,25	0,95	1,36
20.	Frankfurt, 1935/78	2,31	1,44	18,06	0,74	1,06
	$\bar{x}_{18-20}$	2,35	1,51	17,87	0,77	1,08
	$\bar{x}_{1-20}$	2,34	1,39	16,03	0,91	1,00

A. Samples from Transylvania (Romania); B. Samples from German Democratic Republic; C. Samples from German Federal Republic.
Mericarp characters: 01 length in mm; 02 width in mm; 03 appendix number in the side row; 04 medium appendix length in mm; 05 wight of 1000 mericarps in gr. Numbers in brackets are in group A acquisition numbers or seed list numbers (group B and C).

Tab. 3.

The variability seedling and juvenile plant characters analysed.

Nr.	Sample	Characters 01	02	03	04	05	06	07	08	09	10
1.	Nadeș	46,6	27,0	55,0	2,36	56,6	18,3	16,8	130,4	35,6	5,6
2.	Lisa	42,2	20,3	31,8	1,48	3,6	11,0	8,4	96,1	31,6	2,2
3.	Olosig	44,6	26,o	36,5	2,00	46,0	16,0	15,0	116,6	31,4	2,2
4.	Chinteni	48,3	13,6	28,0	2,06	35,8	14,3	10,3	97,8	14,0	1,5
5.	Beiuș	39,5	9,8	25,5	1,50	29,1	10,2	9,8	78,4	13,7	0,6
6.	Săvădisla	39,5	23,3	27,0	1,05	33,5	14,5	10,3	96,3	5,0	0,5
	$\bar{x}_{1-6}$	43,3	20,0	34,0	1,74	39,1	14,0	11,8	102,6	21,9	2,1
7.	Halle	42,0	21,8	39,0	1,76	51,0	14,3	12,3	109,5	30,4	1,0
8.	Gera	27,5	24,0	30,5	1,50	32,0	14,5	10,0	83,5	27,8	1,8
9.	Eberswalde	36,6	31,7	28,7	1,72	32,3	11,7	10,6	100,9	31,0	3,3
10.	Steuden	47,3	26,3	46,0	2,20	48,0	13,7	16,3	121,7	36,0	4,3
11.	Halle S.	44,6	26,2	38,2	2,13	40,3	15,3	12,0	111,3	32,6	2,7
12.	Nossen	50,0	21,3	26,0	1,56	34,0	9,7	8,7	104,6	28,2	3,7
13.	Zerbst	39,3	26,1	35,3	2,10	34,5	14,3	12,6	107,3	33,2	4,4
15.	Sandersl.	43,3	20,0	29,3	2,00	36,6	15,3	12,0	100,0	36,6	3,0
16.	Sangerh.	42,0	22,0	30,0	1,43	35,6	11,3	10,0	96,3	33,2	5,4
17.	Bitterf.	44,0	20,0	35,0	1,20	43,0	14,0	13,0	107,0	30,8	1,7
	$\bar{x}_{7-17}$	41,7	23,5	33,8	1,74	38,7	13,4	11,8	104,2	26,5	3,0
18.	Giesen	51,6	15,3	35,6	1,26	41,3	10,6	11,3	109,3	32,0	3,8
19.	Frankfurt	42,0	29,5	34,0	11,30	46,5	12,0	9,3	120,5	26,4	2,2
20.	Frankfurt	42,3	25,0	39,0	1,60	39,0	1,3	9,3	106,3	29,8	3,5
	$\bar{x}_{18-20}$	45,3	23,6	35,0	1,40	42,3	11,0	10,0	112,0	29,4	3,3
	$\bar{x}_{1-20}$	43,4	22,4	34,3	1,60	40,0	12,8	11,2	106,3	25,9	2,8

Seedling and juvenile plant characters: 01 root length; 02 hypocotyl length; 03 cotyledon length; 04 cotyledon width; 05 length of the first leaf with petiole; 06 width of the first leaf; 07 length of the first leaf blade (without petiol); 08 01+02+05; 09 juvenile root length 10 juvenile root thickness (All data in mm; other explanations as in table 2.).

indicating the existance of genes responsible for hypodotyl coloration in the case of European wild carrot populations too. Variation pattern was detected in the case of the length and thickness of the roots in juvenile stage: populations originated from Germany were generaly more vigurous than that collected in Transylvania. Vigurously developing wild carrot populations were collected in Transylvania only from carrot-growing areas, e.g. from the famous "carrot land" (2). This seems to support our opinion that not only the detrimental effect of wild carrot pollen is important, but gene flow from the reverse direction too.(Sz.T.A.)

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Available for exchange

GHELMEZIU N.G., Lemnul exotic. Lemnul African. Proprietăţi şi utilizări (Exotic timber. African timber. Proterties and utilizations), Editura tehnică, Bucureşti, 425 pg.

Exotic timber captured the attention of botanists, artists, architectures, due to its beauty and outranging variability in colour, design and texture. The present book fulfills a real need, regarding the growing interest for tropical tree species largely utilized for timber, or less known species, which represent valuable sources due to the reserves unexploited till now.

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From this lists which includes about 1500 vernacular and standard names one may identifie the botanical meaning of such names as abaki, abaku, abale, or zombe, zonga, zouloué and zwart ebben for example.

The book is of outstanding interest for botanists, specialists in wood processing, architectures, artists but it is also useful for foresters, specialists in applied botany or African ethnobotany, for professors and students of tropical botany, or specialists working with translations in specialized topics. (E. Ch.).

The volume is available from: Inst. Agr. "Dr.P.Groza", Agrobotanic Garden, 3400 Cluj-Napoca, Str. Mănăştur 3, R o m â n i a.