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FOREWORD

We are glad to present the sixth issue of "Capsicum Newsletter".

The number of contributors and of recipients has grown up and this confirms the usefulness of the publication.

As for the past, none of the contributions has been corrected by the editors. Therefore the authors only are responsible for both the scientific content and the form of the reports.

As it was announced, an International Scientific Committee charged with the supervision of "Capsicum Newsletter" has been established. A. Andrasfalvy (Hungary), R. Gil Orterga (Spain), E. Pochard (France) and C. Shifriss (Israel) accepted to be members of it. The editorial staff is sure that the assistance of the scientific committee will increase the worth and the prestige of the newsletter.

We are going to revise the list of recipients of "Capsicum Newsletter". Please check your address, fill in the form you find at page 119 and send it back to us at your earliest convenience. Next issue of "Capsicum Newsletter" will be send only to whom will ask for it.

Thank you for your cooperation.

Piero Belletti, Maria Ornella Nassi, Luciana Quagliotti

Turin, 31st March 1988

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LIST OF THE AUTHORS

LIST OF THE CONTRIBUTIONS

GERMPLASM RESOURCES OF CAPSICUM FROM SPAIN Capsicum, Newsletter, 6 (1987), 13-14

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Our group started in 1984 a project for collecting vegetable crop species germplasm in Spain, being partially supported by IBPGR/FAO. A list of - the first Capsicum accessions collected was published previously (Nuez et al 1985). Since them we have collected 124 new accessions. Table 1 shows their - characteristics. Currently, some of them have been characterized and reproduced.

Table 1. Accessions collected.

A	B	C	D	A	B	C	D
AN-CA-124	1	0	Dulce	CA-CA-18	2	3	Pimienta de la puta madre
AN-CA-130	-	-	-	CA-CA-19	2	5	Pimienta rabiosa
AN-CA-4	2	0	Corto de Villaviciosa	CA-CA-20	2	3	Pimienta
AN-CA-8	2	-	Ornamental	CA-CA-21	1	-	Pimeinta
AN-CA-9	1	0	Morrón	CA-CA-22	1-2	-	Pimienta
AN-CA-10	1	0	Morrón	CA-CA-23	2	3	Pimiento de la puta madre
AN-CA-11	1	0	Morrón	CA-CA-24	1	0	Pimeinto cuerno cabra
AN-CA-91	1	0	Cuña	CA-CA-25	1-2	-	Pimienta
AN-CA-94	1	0	Cuartro naricees	CA-CA-26	-	-	Pimeinta
AN-CA-95	1	0	Cuartero narcices	CA-CA-27	1-2	1	Pimeinta palmera
AN-CA-103	2	-	Cornarbra corto	CL-CA-1	1	0	Pimiento
C-CA-6	-	3	Pimiento	CL-CA-2	1	0	Pimiento
C-CA-17	-	3	Bicho	CL-CA-3	-	3	Pimiento picante de freir
C-CA-18	-	3	Pebrón	CL-CA-5	1-2	3	Guindilla
C-CA-19	-	0	Pebrón	CL-CA-6	1	0	Pimiento tres venas
C-CA-20	1	0	De Banya	CL-CA-8	2	5	Guindilla
C-CA-21	1	.	Cuatro morros	CM-CA-7	-	-	Pimiento
C-CA-22	-	0	Pebrón de Rues	CM-CA-9	1	0	Pimeinto
C-CA-23	-	3	Pebrón dulce italiano	CM-CA-10	1	0	Pimeinto
C-CA-24	-	3	Bichos picantes	CM-CA-12	1	0	Pimeinto
C-CA-25	-	0	Pebrós de valles	CM-CA-18	-	-	Coral (ornamental)
CA-CA-1	-	3	Pimiento del pais	CM-CA-20	-	-	Pimiento
CA-CA-2	2	3	Guindilla de jardin	CM-CA-21	-	-	Pimeinto
CA-CA-3	2	3	Quemonas	CM-CA-25	1	0	Morrones
CA-CA-4	2	3	Quemonas de corazón de paloma	CM-CA-30	1	0	Pimiento
CA-CA-5	1	3	Palmera	CM-CA-31	1	0	Pimiento
CA-CA-6	-	3	Pimienta rabiosa	E-CA-29	-	-	Morrones
CA-CA-7	2	-	Pi31miento de la puta madre	E-CA-30	1	0	Pimiento
CA-CA-8	-	0	Pimienta	E-CA-31	1	0	Morrón
CA-CA-9	1	3	Morrón	E-CA-32	1	0	Bola
CA-CA-10	2	3	Pimienta de la puta madre	E-CA-33	1	0	Morrón grueso
CA-CA-11	1	3	Pimienta	E-CA-35	-	-	Grueeso
CA-CA-	-	3	Pimienta criolla	E-CA-36	1	0	Gordo
CA-CA-13	-	3	Pimienta	E-CA-38	-	-	Morro de vaca
CA-CA-14	2	3	Pimeinta	E-CA-39	1	0	Bola
CA-CA-15	-	3	Pimienta	E-CA-40	1	0	Cuatro cascos
CA-CA-16	2	3	Pimienta de la puta madre	E-CA-41	-	-	De bola
CA-CA-17	2	3	Pimienta quemona	E-CA-42	-	-	Para colgar
				E-CA-44	1	0	Gordo o cato

A	B	C	D	A	B	C	D
G-CA-1	1	0	Pimiento	V-CA-78	-	-	Tres cantos
MU-CA-1	1	0	Valenciano	V-CA-80	-	-	Largo
MU-CA-3	1	0	Gallego	V-CA-81	1	0	Trompa de vaca
MU-CA-4	1	0	Negral	V-CA-82	1	0	Trompa de vaca
MU-CA-5	-	-	Datler	V-CA-83	1	0	Italiano
MU-CA-6	-	-	Americano	V-CA-84	1	0	Trompa de vaca
MU-CA-7	1	0	Trompa de vaca	V-CA-85	1	0	Valenciano
MU-CA-13	1	0	Guindilla larga	V-CA-86	1	0	Morro de vaca
MU-CA-17	1	0	Largo de Reus	V-CA-87	1	0	Largo de Reus
MU-CA-18	1	0	Valenciano	V-CA-88	1	0	Largo Valenciano
MU-CA-19	-	-	Tres cascos	V-CA-89	1	0	Morrón de conserva
MU-CA-21	-	-	Ramillete	V-CA-90	1	0	Largo de Reus
MU-CA-22	-	0	Morrón de conserva	V-CA-91	1	0	Albaceteño
MU-CA-24	-	0	Mallorquín	V-CA-92	-	0	Bola
MU-CA-25	-	0	Veral	V-CA-93	-	0	Americano
MU-CA-26	-	0	De conserva	V-CA-94	-	0	Bola tinta
MU-CA-	1	0	Corneta gruesa	V-CA-95	1	0	Italiano
MU-CA-29	1	0	Alargado	V-CA-96	1	0	Valenciano
MU-CA-31	-	-	Noras	V-CA-97	1	0	Cristal
R-CA-1	2	0	Cornicabra	V-CA-98	1	0	De freir
R-CA-3	2	5	Algrias	V-CA-99	1	0	Albaceteño del Jucar
R-CA-4	-	3	Guindilla o chiles	V-CA-100	1	0	Naranjuano
R-CA-5	-	-	Pimento	V-CA-101	1	0	Valenciano

A: Identification
B: Group 1: fruits of big size or consistent flesh
Group 2: fruits of small size or no consistent flesh.
C: 0: no purgent
3: purgent
5: high or very high
D: Local name

References:

NUEZ, F; CUARTERO, J; COSTA, J; FERRANO, C; GOMEZ-GUILLAMON, M.L., DIEZ, M.J. 1985, Germplasm Resources of Capsicum from Spain. Capsicum Newsletter, 4, p. 12-14.

Acknowledgements:

We are extremely grateful to the Diputación Provinical de Valencia, Servicio de Extensión Agraria and to all those who have collected vegetable crop germplasm: M.S. Catalá, M.L. Gómez-Guillamón, C. Cortés, G. Anastasio and P. Fernández de Cordova.

CHARACTERISTICS OF SOME LOCAL PEPPERS

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Capsicum Newsletter, 6(1987), 15

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Research work on pepper in our country was first initiated by Professor Pavel Popov in 1933. He established that due to the diversified cultivars and forms of pepper which have been drifted from their American ancestors and which have been transformed to endemic and pure forms Bulgaria stands out as a new and secondary center for the formation of new forms of pepper in Europe.

As a result of expeditions which were undertaken, 129 samples from different parts of the country were collected. They were all divided into groups according to the classification worked out by Professor Popov. Capsicum annuum var. conoides - 42; var. kapia - 29; var.corniforme - 20; var. rotundatum - 18; var.dolma - 2; var. cordatum - 3; ser.var.shipka - 12; ser.var.cerasiforme - 3.

The evaluation is based on the international pepper species descriptor agreed upon by member states of the Council for Mutual Economic Aid, Leningrad 1979. Separate groups are characterized by the following indices: C.annuum conoides - midearly vegetation period 120 days, very leafy, height 41-50 cm, cone shaped, shiny fruit, length 9-15 cm, diameter 2-3 cm, good for fresh consumption; var. kapia - late, veg. period 150 days, large cone shaped fruit, 11-15 cm long, diameter 4-5 cm, dark red when botanically ripe, sweet, suitable for processing; var. corniforme - long, heavily ribbed fruit, length 13-15 cm, diameter 1-2 cm, slightly pungent suitable for processing; var. rotundum - short statured very leafy plants, round flat shaped fruit heavily serrated, slightly pungent, good for processing; ser. var. shipka - short statured 30 – 35 cm, small cone shaped highly pungent fruit, good for fresh consumption and processing; ser. var. cerasiforme – small round very pungent fruit, used for decoration.

Capsicum Newsletter, 6 (1987), 16

GERMPLASM RESOURCES OF PAPRIKA (Capsicum annuum L.) FROM KATRAIN (INDIA)

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Capsicum is the most important summer crop of temperate regions as it requires temperatures regions temperature ranging 25, ± 5-7°C for its different phases of development and are also grown in tropical and sub-tropical areas during winter months. The work was initiated on the germplasm collection, evaluation and seed multiplication to utilize the prevailing natural climate best suited for this crop. The National Bureau of Plant Genetic Resources, New Delhi through .a11 India Co-ordinate Vegetable Improvement Pro3ect has entrusted this station for the exploration, collection, conservation, documentation and maintenance of capsicum germplasm. The NBPGR, New Delhi has been designated by International Board for Plant Genetic Resources (IBPGR) as one of its three gene banks to conserve the Capsicum germplasm. The increased seed after preliminary evaluation arid characterization is being sent to NBPGR for long term storage and exchange of germplasrn. So far this station baa collected 116 accessions both indigenous arid exotic out of these 92 are in reproductive and characterization phase in field. Great variability was observed in 74 accessions, which were characterized after preliminary evaluation into different groups and are planted this year for increasing the seed. Twenty qualitative characters along with characters of biological value were recorded as per I3P~.'S action plan (Genetic Resources of Capsicum, 1983) en4 three paprika groups according to fruit shape and co1or were made (Somos, 1984) are :-

1. Vegetable paprika with fruits round, blocky and conical shape
   - 37 accessions.
2. Salad paprika with white (wax yellow) fruits -10 accessions.
3. Spice paprika pungent and sweet with conical arid elongated fruits - 27 accessions.

REFERENCES

Somos, A. (1984), The paprika, Kultura Publication. Budapest, Hungary.

[Capsicum Newsletter, (1987), 17-18]

EVALUATION OF LOCAL ACCESSION OF PEFPER (Capsicum annuum) AT SAMARU, NIGERIA

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Sixteen cultivars of peppers collected from different ecogeo-graphical zones of Nigeria were grown for two years in replicated trials at Samaru for evaluation. The variations observed in the data collected for each trait were highly significant. The traits, which indicated a high level of variation, were number of fruits per plant, number of branches per plant, and fruit weight. Significant differences were also observed for yield, number of fruits, fruit weight, and days to maturity. The cultivars X year interaction were also significant for all traits except plant height and number of branches. Examination of the magnitude of the cultivar X year interaction variances for all the characters relative to the cultivar variances revealed that the respective cultivar variances were larger than their cultivar X year variances. This indicates that the ranking of the cultivars for yield and other characters is expected to be stable for the two years.

Table 1: Mean Performance of Sixteen local collections of pepper (Capsicum annuum L.) Accessions grown at Samuru for two years.

Accession number	Yeild (g/m^2)	Plant height	Number of branches per plant	Number of fruits per plant	Fruit Weight (g)	Fruit length (CM)	Fruit diameter	Days to Maturity
A001	382.28	36.31	22.28	9.99	19.24	8.15	2.18	137.13
A002	511.84	38.79	27.33	8.44	26.70	7.45	2.78	137.00
A003	741.26	44.20	37.09	19.28	16.58	5.06	2.38	131.38
A004	678.32	47.78	35.43	17.23	16.44	5.15	2.92	132.50
A005	565.52	40.38	25.66	10.57	23.00	7.72	2.53	130.88
A006	527.22	39.75	23.53	9.40	28.61	7.14	2.87	139.63
A007	546.74	39.98	32.94	11.68	21.74	7.82	2.32	127.13
A008	381.86	35.58	23.36	8.05	22.49	7.29	2.52	130.50
A009	35160	33.93	26.85	14.06	11.24	6.05	1.98	139.88
A010	448.79	36.64	23.71	8.40	25.34	7.85	2.64	136.38
A011	512.37	37.20	97.53	63.61	3.33	7.62	0.77	132.63
A012	300.23	36.83	28.49	15.50	8.00	5.87	1.67	135.00
A013	695.22	42.03	34.91	23.76	12.28	6.86	2.01	130.88
A014	706.54	44.68	33.70	17.29	17.82	6.95	2.50	129.38
A015	522.19	28.24	38.60	17.38	12.19	6.30	1.77	128.75
A016	687.44	43.5	178.24	70.86	4.13	4.65	1.10	132.00
Mean	534.95	39.7	43.12	20.16	16.82	6.74	2.18	131.92
C.V.%	25.94	9.6	93.21	93.92	46.17	16.47	28.11	2.29

[Capsicum Newsletter, 6 (1987), 19-20]

A COMPLEX EVALUATIN OF GENE BANKS OF PEPPER (WILD, SEMICULTURED AND CULTURED) AND THEIR USE FOR BREEDING PURPOSES

By A.P. Samovol, V.K. Andryusbchenko and. V.I. Zatuliveter Institute of Ecological Genetics of the Academy of Sciences of the Moldavian SSR, Kisbinev, USSR
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A complex study of a collection of peppers (over 2000 samples) was conducted for morphological, biochemical, physiological and other evaluations (degree of compatibility, dominance, cross pollination, homologous ness in adaptive standards of reaction under stress effects, the influence of extra chromosomes on commercially useful and other traits, correlation dependence and other).
An analysis of phytopathologioal estimation-presented in the worlds of Holmes (1937), Gruenleaf (1956), Timina, Samovol et al. (1979) (the authors had identified within populations of wild and semi cultural peppers - single genotypes, resistant to tobacco mosaic virus, the etch in leaves, potato virus - X, M, S, Y), as well as data obtained by physiological estimation (Samovol et al., 1979) and a more extended biochemical appraisal (Andryuschenko, Samovol et al., 1979, 1983) has revealed that distant ancestral forms ‘nave a significant potential of genetic sources of commercially valuable traits. Thus, the solution of the problem of transferring these characters into the genome of cultivars, the question of interspecific interrelations and other issues acquire a particular importance.
In elucidating the reproductive interrelations that were formed by evolution between species of the genus Capsicum L., differentiating degree of compatibility was established which manifested itself in the setting of fruit with normally developed seeds in the combination C.frutescens x C.annuum L., by the presence of a definite percentage of underdeveloped seed in the fruit - C.pendulum W. x C.annuum L., by the absence of set fruit - C.pendulum W. C.annuum L., by the absence of set fruit in crossing C.pubescens x C.annuum L.

The manifestation of homology in adaptive standards of reaction was recorded (the fertility of pollen after stress effects of high temperature and UF-radiation) in two species of the genus Capsicum L. (C.chinense J. and. C.frutescens L.), which corresponds to their close phytogenetic relationship.

According to our data, the percentage of natural over pollination depending on variety varied from. 0,8 to 46,8. The varieties - 'Kalinirovsky', 'Otborny' and 'Tolstostenny' are of special interest and turned out to be strict self-pollinators.

The evaluation of the trisomic collection has shown that possibly there exists a dose effect in extrachromosome of the third trisomic by the extension of the spread of opened cotyledon leaflets (the level of significance of F=0,99 the third and tenth trisomic by the length of the scape of the first flower, the plant height and. mean weight of the fruit, in comparison with disomic acid content in fruit was not established.

In cross combinations studied by us, the degree of dominance in commercially—valuable and other quantitative characters vane from 1,0 to + 1,0. Nevertheless, for some (basic) traits, a definite orientation of the degree of dominance was noted. In comparing the magnitude of the correlation coefficient in paired traits for different varieties and their F_1 hybrids, it was established that the index quantity of the relationship of two characters reveals itself from combination to combination variously (either an intermediate type of inheritance is displayed or they are higher or lower than in parental forms). However, for single pairs of traits in hybrids, dominance of indices of the quantity and direction of the correlation coefficients was absorbed which allows us to consider the question of the character of revealing "systems of correlated traits". The meeting of galaxies with a display of a rupture in connections between single traits in hybrid offspring under high enough of the correlation coefficients in parental forms has drawn attention. Most probably this is connected with genomic interactions of the crossing components.

[Capsicum Newsletter, 6 (1987), 21-22]

TLC-SPECTRA OF CARTENOID FRUIT PIGMENTS IN SOME PEPPER SPEC IES

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The carotenoid compostion of ripe fruits of eight red-fruited pepper species was investigated. The carotenoids were extracted with acetone-ethanol (3:1), saponified one hour with 12% KOH in 85% aqueous methanol, and developed by thin-layer chromatography (TIC) on. Dc-Cards Sit (Seelze, Haxmover) in petroleum ether-acetone-ethanol (70:25:5) solvent.

The TIC pigment spectra (Fig.1) and the visible absorption spectra of every pigment showed that the investigated pepper species mad the same qualitative cartenoid composition of the fruits. The optical density of the chronatograms didn't - give exact information about the content of the different components as they were of different color (yellow, orange, red). The TLC-spectra, however, allowed to estimate the similarity and the differences between the investigated species according to the ratio of the quantitative pigment content. For example the fruits of C.frutescens had the highest relative level of Beta-carotene, while that of C.chacoense - the lowest one. There was a considerable variation in the ratio between the content of xanthophylls 12 and 13 as well as that of the xanthophylls in relation to capsantin level (band 10). Differences in the ratio of other pigments were also registered. These data suggest the existence of differences in the carotenogenic systems of the species, most probably at a regulatory level, though the fruits are of the same pigment type ($y^{+}c_1^{+}c_2^{+}$, according to Hurtado-Hernandez and Smith, 1985).

The TLC method enables the rapid characterization of carotenoid spectra of a great number of samples unlike the time consuming column chromatography. TLC is suitable for routine analysis of pigment formation in the segregating hybrid progenies.

HURTADO-HERHANIDEZ H., P.G.SMITH, 1965, Inheritance of mature fruit coclor in Capsicum annuum L., J. Heredity, 76, 3, p.211.

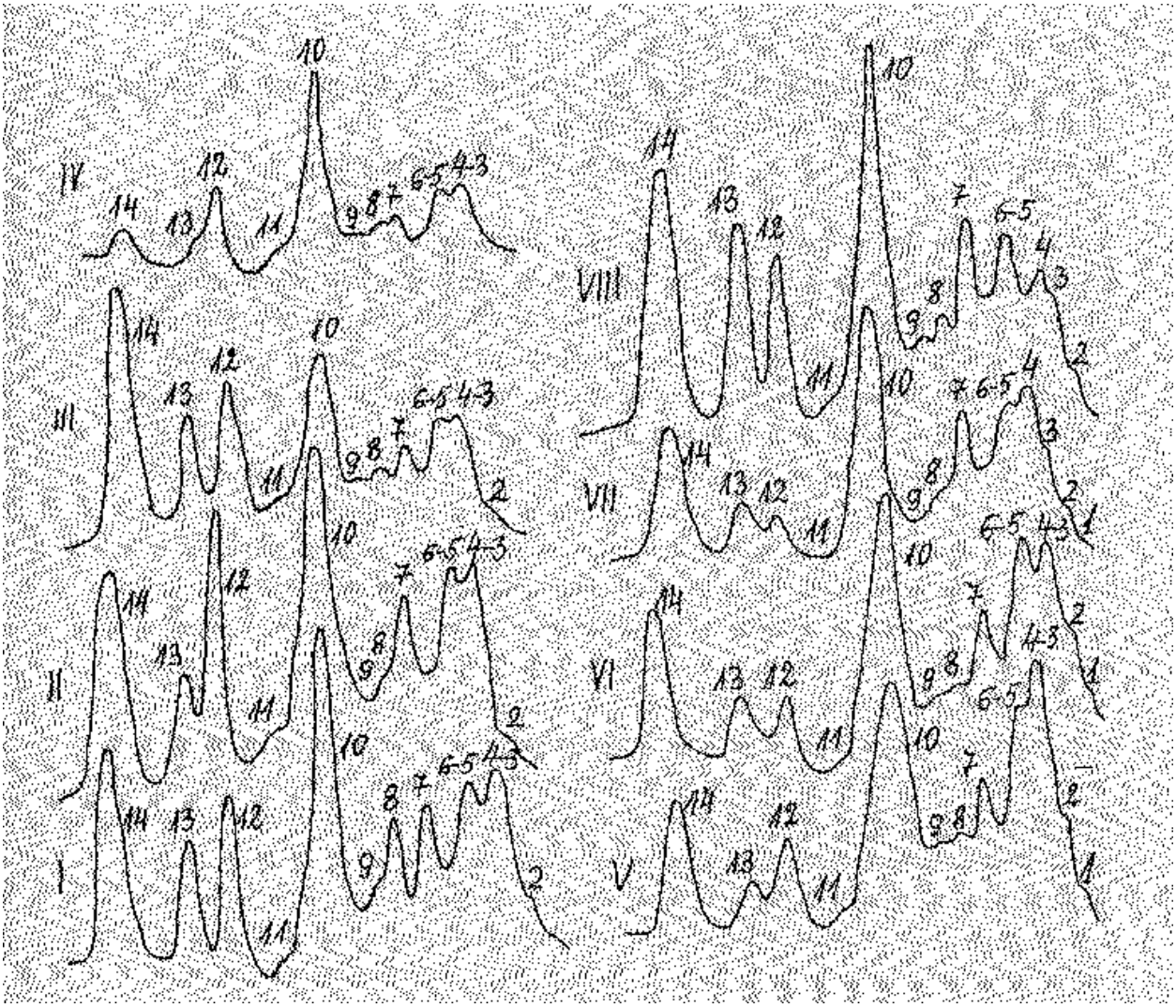

Fig.i. TLC - carotonoid spectra of some pepper species.
I - C. annuum v. annuum; II – C. annuum v. glabriusculum; III – C. frutescens;
IV - C,chacoense; v - C.baccatum v.baccatum VI - C.baccatum v. pendulum; VII - C. eximium; VIII - C. pubescens.

The spectra are registered on a densitometer ERY - 65 (Zeiss, Thna) at 430 mn. Pigments with similar mobility and the same colour and absorption spectra are designated by the sane numbers: 14 β-caroten; 1, 3, 4, 6, 8, 10, 11 - red xanthophylls (capsanthin, capsorubin, etc.); 2, 5, 7, 9, 12, 13 — yellow and orange xanthophylls.

[Capsicum Newsletter, 6 (1987), 23-24]

DISTRIBUTION PATTERN OF ^{14}C-SUCROSE IN CAPSICUM ANNUUM L. (VAR. ARRA BASANT)

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The fourth loaf of a Capsicum plant was fed with 5 uCi C-sucrose at vegetative, flowering and fruit development stage. Plant fed at each growth stage were harvested 48 hours after feeding or at later stages for determining the distribution of 140.

The fed leaf was found to retain substantial amount of the initially in plants fed at vegetative and flowering stages (i.e. 52.0% and 30.3%); but with the development of the fruits, the amount of radiocarbon significantly decreased (6.5 to 13.2%) in the fed leaf (Table I). Stem and leaves appeared to be strong sink till fruit development stage. The percentage of exported ^{14}c increased with the advancement of the growth. Maximum ^{14}C (88.6% to 93.5%) was exported to different plant parts at the fruit development stage, followed by flowering (75.7% to 87.0%) and vegetative stage (48.0%). At the fruit development stage maximum relative specific activity (1.3 to 3.3) Was obtained in tie stem followed by the flowers and fruits. The upward and downward movement of the exported carbon was influenced by the development stages of the crop. A substantial enhancement in the relative activity of flowers and fruits were obtained during the later stages of crop growth.

Table 1. Percent distribution of ^{14}C-sucrose in Capsicum annuum L. (var. 'Arka Basant') fed at vegetative, flowering and fruiting stages

Plant parts	Fed at vegetative stage			Fed at flowering stage		Fed at fruiting stage
	48^{h} after feeding	At flowering stage	At fruit development stage	48h after feeding	At fruit development stage	48h after feeding
Fed leaf	52.0	13.2	10.0	30.3	6.5	11.4
Leaves above fed leaf	15.2	18.2	17.2	13.2	18.7	11.2
Stem above fed leaf	2.7	16.5	10.7	10.6	13.0	2.5
Leaves below fed leaf	12.6	11.8	7.0	4.5	1.0	6.4
Stem below fed leaf	13.2	16.1	15.1	19.6	15.3	45.2
Roots	4.3	19.7	26.4	17.3	31.9	9.7
Flowers and fruits	-	4.7	13.5	4.5	13.6	13.6

[Capsicum Newsletter, 6 (1987), 25]

STUDY OF ANALYTICAL ELECTROPHORESIS 0N CAPS ICUM GEMPLASM

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Gel electrophoresas were, employed in the present study. The best sampling tissue and sampling time for electrophoresis of peroxidase (POD) isoyzmes were functional leaf at flowering stage. Eight species were divided into four groups' based on their zymograms; Group A, inocluding C. annum, C. frutescens and C. chinense; Group B, including C. chacoense and C. pubescens; Group C, including C. Praermi.ssum; Group D, including C. baccatum and C. eximium. 80 accessions of C. annuum var. annuum, most of them are Chinese land races, falls into three types, 73 of them belong to type a, 5 type b, end 2 type C.

The susceptible type of pepper plants were compared with the resistant type and higher enzyme activity were observed in susceptible ones. Zymograms of F_1 hybrids and thieir parents of seedling stage and adult stage were studied and "hybrid enzyme hand" does not exist at all the developing stages. The existence "hybrid enzyme band" only at I
the seedling stage with high heterosis crosses, it may be due to the gene sequence of expression.

A CHROMOSOMAL CHI MAERA IN CAPS ICUM

[Capsicum Newsletter, 6 (1987), 26]

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A chimaeral plant with three distinct primary branches exhibiting diploid, mixoploid (diploid and tetraploid) and tetraploid numbers respectively was recorded for the first time in colchicine treated plants of x 235, a local cultivar of chilli..

The Plant was highly vigorous with increased plant height, spread and fertility. Further, the branches differed in their phenotype in exhibiting leaves, flowers, and fruits and stomata characteristic of their corresponding chromosome number. The mixoploid branch displayed intermediate features of both diploid and tetrap bid branches. Further, fertility and yield were high in the chimaeral plant compared to those of the: diploid and tetraploid sibs.

The chirnaeral nature can be attributed to the endoreduplication of some of the cells in the apical bud due to differential activity of the colchicine. The mixoploid numbers may be formed as a result of spindle abnormalities during premeiotic mitosis. The chimaeral plant has immense cytogenetic importance since it has the potentiality to generate polyploids and aneuploids in the progeny, which in turn are powerful weapons in understanding the chromosomal architecture and cytogenetic relationships of the crop.

A TERTIARY TRISOMIC IN CAPSICUM

[Capsicum Newsletter, 6 (1987), 27]

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A tertiary trisomic was reported here for the first time In the open-pollinated progeny of a second generation Interchange heterozygote which inturn was obtained in the progeny of a triploid Capsicum annuum. Phenotypically, it was quite distinct from the diploid with a significant increase in plant height, weak thin stem, shortened internodes; dimorphic leaves of large and small sizes, whorled arrangement of leaves and fruits in clusters of 2-3.

Meiotic studies revealed the chromosome number as 2n=25 and the maximum possible association observed at diakinesis and metaphase I was a chain of five chromosomes. The association is either a chain, frying-pan or a dumb-bell type with a frequency of 29.16%, 15.28%, and
2.78% respectively. The mean chiasma frequency per cell was 21.82 while in the diploid it was 19.97.

Meiosis was irregular with unequal separation and formation of laggards, micronuclei and polyads. Pollen fertility was reduced to 48.28%. The tertiary trisomic might have originated from the Interchange heterozygote where n + 1 gametes are formed as a result of occassional 3:1 disjunction in an interchange ring of four chromosomes (Ramage 1960, Das and Goswami 1967, Das and Srivastava 1969).

LI TERATURE

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Capsicum. Newsletter, 6 (1987), 28-29

EFFECT OF MUTAGENIC FACTORS ON RECOMBINATION PROCCESS IN PEPPER

Report 3. Induced, alteration in distribution parameters of quantitative traits

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We have previously shown the possibility for lowering significantly the crossing over frequency in the marked segment al_2-b treated by 1,4 bis DAB (concentration 0,002%) + centrifugation of F_1 hybrid. seed. In view of this, of great interest is the studying of the influence of this effect on the conduct of quantitative traits including commercially valuable characters in F_2. Thirteen traits were selected for studying (table 1). Investigations have shown that treatment by a factor blocking crossing over in the indicated segment has led to the alteration of average values, the decrease and. increase of dispersions, occurrence of forms with new values and trait combinations. A substantial increase was obtained for the traits of the first fruit, set height number of fruit, set total yield and number of standard fruit. This suggests that the reaction of marked Chromosome segments to antirecombinogenic action is not always a reflection of the whole range of genetic material.

It is assumed that the reactions for the observed changes are mainly due to shifts in segregations for loci controlling the differences in original forms, and to variations in crossing over level in linked genes outside the marked zones.

Table 1. Effect of treatment by 1,4 bis DAB (concentration 0,002%) + centrifugation of F_1 by hybrid seed on distribution parameters of quantitative traits in F_2

Trait	Control			1,4 bis DAB (0,002%) + centrifiguation		
	X	2	CV, %	X	2	CV, %
Plant height, cm	51,9±0,5	$1,55.10^2$	24,0	50,4±0,8	8,69 10**	18,5***
Length of shoot to first fruit, cm	18,1±0,4	8,74.10	51,6	19,7±0,6	4,17 10**	32,8***
Total number of fruit places	38,9±1,5	$1,34.10^3$	94,3	38,1±3,4	$1,28\ 10^3$	94,0
Number of set fruit	7,9±0,2	1,44.10	47,9	9,3±0,6	3,87 10**	66,6*
Number of fruit to harvesting date	9,8±0,2	2,95.10	55,7	11,5±0,5	3,36 10*	50,6
Bulk of harvested yield, g	384,6±8,3	$4,76.10^4$	56,7	404,4-19,5	4,61 104	53,1
Number of standard fruit	6,3±0,1	1,04.10	51,2	7,5-0,3	4,29 10***	87,8***
Mass of standard fruit, g	344,6±7,5	$3,79.10^4$	56,5	351,1-16,7	$3,22\ 10^4$	51,1
Mass of above ground portion (without taking into account fruit load) g	182,6±3,6	9,23.10	52,6	181,5±8,5	$8,79\ 10^3$	51,7
Root mass, g	31,1±0,5	$1,65.10^2$	41,2	29,0±1,2	$1,73\ 10^2$	45,4
Height of fruit, cm	9,5±0,1	0,44.10	22,1	9,3-0,2	0,42 10	22,0
Fruit diameter, cm	4,3±0,0	$4,40.10^{-1}$	15,3	4,0±0,2	$3,20\ 10^{-1}$	14,1
Thickness of pericarp, mm	3, ±00,0	$0,10.10^{-1}$	26,7	3,0±0,0	$0,10\ 10^{-1}$	23,2

*, **, and *** - differences significant at $P < 0,05$, 0,01 and 0,001 respectively

[Capsicum Newsletter, 6 (1987), 30-32]

CROSS-POLLINATION EXPERIMENTS WITH BEES IN ITALY AND HUNGARY

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Ten-fifteen years ago we started to study the percent of the cross-pollination with anthocyanin less marker gene and with male sterile gene in Hungary. These experiments were in open field in natural condition or under the net with bees. The data of this experiments were not so good, because the seed production of sterile plants were only 10-15 % of fertile plants. Therefore we produced a new line with other anthocyanin less marker gene /Aal/ and with a male sterile gene /ms-3/. The basical materials herited from Bulgaria. The name of the new line is Aal ms-3D. After the first good Hungarian results we tried this line in natural condition in Italy in 1985/86. /Csilléry et al. 1986/.

In 1986 in Italy /Ascoli Piceno - Land Marche/ parallel with the natural cross-pollination experiments we organized another experiment with the Aal ms-3D mother line and with a hot, long and green fruit type father line /from L.Unici/ in the open field. Type of parcels: 1. in natural condition, only native insects and wind effect, 2. Under the net only with hand pollination, 3. under net only with bees. One parcel was 25 m^2 in two repetitions. Transplantation system in all parcels: F + M + F + M + M + F. The F = father line with normal anthocyanin content, the M = Aal ms-3D mother line. The results are in the table 1.

In 1987 in Hungary we organized similar experiment with the Aal ms-3D mother line and with the waxy fruit type cv.Táltos, which has normal anthocyanin content, in the open field. The

type of parcels: 1. in natural condition only native insects and wind effect, 2. under the net only with hand pollination, 3 under the net only with bees, 4 under the net only wind effect /insect free/. We divided all the 4 types to three smaller parcels. Namely: in the 1 a, 2 a, 3 a, 4 a parcels the Aal ms-3D mother line was selected to 100% sterile plants, in the 1 b, 2 b, 3 b, 4 b parcels we signed the 50 % sterile and 50 % fertile plants from the Aal ms-3D mother line, but we did not select the fertile or sterile plants, in the 1 c, 2 c, 3 c, 4 c parcels the Aal ms-3D mother line was selected to 100 % fertile plants. In autumn we signed whether the fruits were harvested from sterile or fertile plants. Transplantation system: F + M + F + M + M + F. F = father line with normal anthocyanin content, M = Aal ms-3D mother line. One parcel was 35 m^2 in two repetition. The results are in the table 1.

The bees effect under the net was not efficient. Through the season the bees were nervous and want to escape, because the place was not enough for the orientation. In the open field the native insects were very active and the seed production of sterile plants was 60 - 70 % of normal fertile plants.

It seems that we can use this anthocyanin less and male sterile mother line and this hybrid seed production method in the practice.

Literature:

CSILLERY G. - SACCARDO F. - UNOINI L. - LEONE A. - CHIARETTI D.,
1986, Natural cross—pollination experiments in Italy, with
Meeting on Genetics and Breeding on Capsicum and Eggplant.

Zaragoza /Spain/, 45 – 50. p.

Table 1 Cross-pollination experiments of Aal ms-3D line with bees and in native condition in Italy and in Hungary in 1986/87.

	1. natural condition, only native insect and wind effect		2. under the net, only with hand-pollination		3. under the net only bees		4. under the net only wind effect	
	Fruit size l/w	Seed fruit	Fruit size l/w	Seed fruit	Fruit size l/w	Seed fruit	Fruit size l/w	Seed fruit
Ascoli Piceno in 1986								
Aal ms-3D a, 100% sterile	12/2,5	116	12/2,0	133	9/2,0	43	-	-
Nagyszénás in 1987								
Aal ms-3D								
A, 100% sterile in plot	13/2,5	96	12/2,5	146	9/2,0	18	10/2,0	30
B, 50% sterile: 50% fertile in plot								
- only steriles harvested	12/2,6	123	-	-	7/1,5	30	8/1,5	14
-only fertiles harvested	12/2,8	167	-	-	14/3,0	145	14/2,5	134
C, 100% fertile in plot	12/2,8	167	-	-	15/3,0	162	12/3,0	165

L = length of fruit

W = widgth of fruit

PRELIMINARY TESTING FOR ACIDITY IN HOT PEPPER IN TUNISIA

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In Tunisia hot peppers are being used for consumption as green fruits, or processed as red powder or as "harissa", which is a punguent paste of pepper pulp mixed with certain spices. It is an important crop for the national market: in 1985 the consumption of green pepper was 10 kg per person per year, of harissa 0.5 kg and of powder 1.35 kg (Institute for Statistics, Tunis). With an average production of 35,000T over 1983 - 1986 is pepper the 4th vegetable in importance in Tunsinia, after tomato, melon and watermelon, and potato (VII plan, Min. of Agriculture, Tunis). Harissa is also exported; 92% of the export goes to France: see table 1.

Knowledge about the acidity in pepper fruits is particularly important for the harissa regarding conservation. The total acidity of harissa, expressed as citric acid, may not exceed 1.8% of the dry matter according to Tunisian norms (I.N.NOR.P.I., 1983a).

Within the framework of a programme for the development of industrial varieties, a start has been made to analyze the acidity, and investigate into selection possibilities of existing breeding material.
Fully mature fruits of four local selections, four F_9-breeding lines (originated from crosses between foreign varieties), and their F_1- populations have been analyzed according to the potentiometrical method (I.N.NOR.P.I., 1983b). For this purpose for every line or population appr. 10 fruits have been cut tip into small pieces, from which the experimental sample has been drawn. The plants have been planted in a plastic tunnel in a complete randomized block design with three replications. The analyses have been done in may-june 1987.

Average values of the acidity for the parent-groups and the F_1- populations are presented in table 2.
No significant differences have been observed between lines and F_9 - populations. Selection for low acidity in further generations in this material is expected therefore to give little success. In addition, the parents didn't show significant differences regarding general combining ability. Parent x offspring regression analysis shows no significant correlation between parents and descendants, implying that the two don't resemble much: the heritibility is expected to be low.

Despite these results, it is recommended to analyze plant material for future crosses, as well as local varieties, considering the relatively high average values found for two local varieties 'Beldi' an 'Nabeul II', growing under similar conditions and analyzed during the same period (table 2).

I.N.NOR.P.I., 1983a. Concerves de piments "harissa". N.T. 52-07.
5 pp.
I.N.NOR.P.I.1983b. Produits derives des fruits et legumes.
Détermination de l'acidité titrable (métentiométrique de reference). N.T. 52-15.
3pp.

Year	Export (kg)	Value (Tun. Dinars)
1983	1,771,317	1,905,864
1984	1,816,625	1,612,691
1985	1,502,293	1,772,742
1986	1,614,652	2,407,896

Table 1. Export of harissa during 1983-1986.
(Institute for Statistics, Tunis)

Material	Average acidity (%)
Local selections	1.57
F9-breeding lines	1.58
F1-populations	1.64
Grand mean	1.62 (CV = 16.88%)
'Beldi'	2.01
'Nabeul II'	2.24

Table 2. Average values for the percentages total acidity expressed as citric acid, of the dry matter, for some breeding material.

Capsicum Newsletter, 6 (1987), 35

MALE STERILITY AND MANIPULATION OF YIELD IN CAPSICUM

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Male sterility and its manifold importance In hybrid seed production has been well documented in a variety of crop plants. The development of a genetic malesterile line in our Laboratory has led to plan a programme on its utility in producing heterotic hybrids. So in the present study the 'ins' line has been employed as pistillate parent and nine local cultivars as pollinators to fix the best pollinator line. Among the pollinators used, LCA 197 and 'santaka' displayed good combining ability. Normal meiosis and formation of 12 II in hybrids indicated high degree of homology of parental chromosomes. The hybrids (ins x 197 and ms x santaka, exhibited higher yields over parents and superior pod quality with 33.08% and 46.39% of heterosis respectively.

The study is of immense value in the development of varieties with high yield.

Literature:

1. Sriramachandra Murthy, N. and N.Lakshmi 1979. Male Sterile mutant in Capsicum annuum L.

Capsicum Newsletter,6 (1987), 36

A NEW VARIANT WITH CLEISTOGAMY IN CAPSICUM

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The extent of natural cross-pollination in chill i has been reported to be 2 to 68% by various research workers. Since there will be prolonged flowering overlapping with fruit formation in 3-5 flushes and chili flowers possess nectar glands, there is a possibility for high percentage of natural cross-pollination as such the maintenance of purity is a problem. The various methods of selfing like covering entire plant with muslin cloth bags, or branches with thin paper bags or enclosing flower buds with cotton lint did not yield satisfactory results.

In the population of 'Kiran' (C. annuum x C. frutescens) one plant with cleistcgamy was identified in 1986-87. The plant was normal in habit and the flowers did not open even after maturity. Self-pollination occurred in the unopened flowers and fruit setting was normal. Cytological studies revealed that chromosome number was normal (2n = 24). Studies on its inheritance and transfer of this valuable trait into commercial varieties for easy maintenance of purity arein progress.

Literature:

Murthy, N.S.R. and B.S.Murthy; 1962, Natural cross pollination in chilli. Andhra AgrCic. J. 9(3) 161-165.

Odland, M.L. and A.M. Poster, 1941, A Study of natural crossing in pepper. Proc. Am. Scc. Hort. Sci.38. 585-588.

Csillery, G: L. Quagliotti and A.Rosa; 1986, Natural cross

pollination experiment on pepper (Capsicum annuum L.) in Piedomont, Italy. Capsicum Newsletter Vol. 5. 38-39.

SEASONAL VARIATIONS IN THE PERFORMANCE OF PEPPER (Capsicum annuurn L.) IN NORTHERN NIGERIA

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Striking seasonal variations in all the characters considered were shown by eleven varieties of pepper grown in Samaru (11°11'N; 07° 38'E) in two distinct seasons. Varietal differences as well as variety X season interaction were highly significant for yield and other fruit characteristics indicating that different varieties reacted differently to the seasons.

Examination of the mean temperatures between the seasons indicate that the growth of the plants might be more influenced by the minimum temperature which falls to as low as 12°C in the dry cold 'hamattan' season. This low temperature is enough to stagnate the growth of the plants and their ability to produce fruits. The mean maximum temperature also occurs during the dry season. The very sharp fluctuations between the minimum and maximum temperature in the dry season (12.50 - 36.30°C) at different growth stases makes it very difficult for the plants to adjust to the discomforts. These eventually lead to poor vegetative growth and the production of small poor shaped fruits.

In the wet season, which is warmer with less extreme fluctuations of temperatures, higher yields, and better-shaped fruits are obtained.

Table 1. Mean seasonal Temperatures and Relative Humidity at Samaru
11°11'N; 07°38'E

	WET SEASON	DRY SEASON
Maximum Temp. (°C)	30.19 ± 0.77	32.52 ± 1.19
Minimum Temp. (°C)	19.67 ± 1.07	16.13 ± 0.87
Relative Humidity (%)	65.35 ± 3.72	20.27 ± 3.92

Table 2. Mean performance of Eleven pepper varieties I two distinct seasons

	YIELD (G/M^2)		WEIGHT/FRUIT (g)		DAYS TO MATURITY	
VARIETY	VS*	DS	WS	DS	WS	DS
KD3	1142.54	695.00	17.07	6.43	130.66	167.33
KD2	1041.88	764.00	23.39	6.06	150.00	170.67
DK4	984.48	590.20	22.04	6.85	144.33	170.00
SO1	805.0	480.40	7.91	4.63	136.00	165.00
SO2	752.08	568.10	17.38	9.21	136.00	164.00
HLH	670.20	433.00	24.39	24.44	110.00	150.00
SO3	657.723	350.20	14.36	6.90	141.00	165.00
KD1	442.96	226.50	23.00	4.08	146.00	169.00
OY1	427.14	298.50	17.11	8.71	139.00	165.00
KN3	354.34	176.00	24.55	3.17	137.00	159.00
SO4	233.10	748.00	10.48	5.08	143.67	165.00
Mean	690.20	433.00	18.33	7.78	138.58	165.634
C.D. (.01) for seasons		197.95		7.36		8.37

*WS = Wet season, DS = Dry season

Capsicum Newsletter, 6 (1987), 39-40

HERITABILITY OF PLANT CHARACTERS IN CAPSICUM CHINENSE JACQ.

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This papers reports of results of a study on gene action and heritability determining characters of plant in Capsicum chinense Jacq. The experimental material consisted of five imbred lines and all possible F_1' s from these line (not including reciprocals).

The experimental design consisted of four randomized blocks. Data on individual plant were recorded for yield /plant, days to flowering, days to maturity, plant height and plant width. Statistical and genetic analysis were made by model 2, method 2 of Griffing.

The specific combining abilities estimates (non-additive gene effects) were considerable higher than the general combining abilities estimates (additive gene effects) which in turn were also highly significant for the characters, yield / plant, days to flowering, days to maturity, plant height and plant width.

For the plant characters, the estimates of heritability in the narrow sense were 0.00%, 10.56%, 47.06%, 2.92% and 0.00% for yield/plant, days to flowering, days to maturity, plant height.

GRIFFING, B., 1956, Concept of general and specific combining ability in relation to diallel crossing system.
Aust. J. Biol. Sci. 9 (4)463-493.

TABLA.1 Mean squares and significance levels for plant characters from diallel analyses for combining ability.

Source of variation	Yield/plant	Days to flowering	Days to maturity	Plant height	Plant width
GCA	42.750.00$^{n.s.}$	40.020$^{n.s.}$	184.370$^{n.s.}$	57.780$^{n.s.}$	108.220$^{n.s.}$
SCA	289.613.400**	26.100**	39.160**	52.050**	148.170**
ERROR	17.431.410	1.730	2.040	16.100	26.630

TABLE 2. Estimates of heritability for plant characters in Capsicum chinense Jacq.

Character	$\hat{h}a^2$ (%)	$\hat{H}r^2$ (%)
Yield / plant	90.61	0.00
Days to flowering	75.36	10.56
Days to maturity	89.17	47.06
Plant height	67.15	2.92
Plant width	84.16	0.00

$\hat{h}a^2$ = Broad sense heritability estimate.

$\hat{h}r^2$ = Narrow sense heritability estimate.

GENE ACTION, AN INDEX FOR HETEROSIS BREEDING IN SWEET PEPPER

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The understanding of gene action and their pattern of inheritance is essential for selection of breeding procedure. Adoption of suitable selection method would be further facilitated by knowledge of heritability. A diallel set involving eight varieties their F_l, F_2, BC_1,and BC_2 generations were studied to find out suitable method for breeding sweet pepper. Gene effects and their interactions were worked, out by the method proposed by Hayman (1958).

Results indicated presence of more of non-additive gene effects than the additive on the basis of performance of F_l and further inbreed ding depress ion in F_2 generations.
Genetic components also showed similar trend. Epistatic effect of dominance x dominance was more prevalent than additive x additive and additive x dominance. Crosses showing high heritability for yield indicated reliance on conventional breeding methods, as the selection would be more effective. Predominance of non-additive gene effect and absence of non-Interacting crosses for yield indicated towards utilization of heterosis to obtain better production.

Eleven crosses out of twenty eight exceeded mid parent value as well as better parents but only six crosses gave significantly higher yield than the best parent ‘Russian yellow’ (Table). The maximum heterosis was evident in the cross ‘Harris Early Giant’ x ‘Vinedale’; but when compared to the best parent, ‘Russian Yellow’ x ‘Harris Early Giant’ topped in this respect followed by ‘Yolo Wonder x ‘Harris Early Giant’.

REFERENCE

Hayman, B.I.(1958) The separation of epistatic from additive and dominance variation In generation means. Heredity 12:371-90.

Table – Percentage of heterosis over mid parent (MP), better parent (BP) and heterability for yield in Sweet pepper.

Crosses	Av.yield g./plant			Heterosis over		Hetitability
	MP	BP	F_1	MP	BP	
'Russian Yellow' x 'Harris Early Giant'	516	650	899	74.22	38.30	49.31
'Yolo Wonder' x 'Harris Early Giant'	388	393	821	111.59	108.90	46.32
'Harris Early Giant' x 'Vinedale'	358	383	818	128.49	113.37	54.69
'Russian Yellow' x 'Bighart KL'	538	650	812	50.92	24.92	76.77
'Sola' x 'Vinedale'	390	463	722	85.12	55.93	40.23
'Harris Early Giant' x 'Bighear KL'	405	426	685	69.13	60.79	63.82
'Yolo Wonder' x 'Bighart KL'	418	426	639	52.87	50.00	48.40
'Sola' x 'Bjala Kapiya'	453	463	637	40.61	37.58	55.20
'Sola' x 'Bighart KL'	445	463	632	42.02	36.50	70.46
'Bjala Kapiya' x 'Vinedale'	388	443	532	37.11	20.06	53.31
'Vinedale' x 'Bighart KL'	380	426	520	36.84	22.06	41.76

Capsicum Newsletter, 6 (1987), 43-44

HERITABILITY STUDIES IN SWEET PEPPER

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ABSTRACT

The heritability in narrow sense was studied for the following characters: yield; number of fruits per plant; fruit mean weight; plant and fruit size and per carp thickness in a ‘Español’ segregate population, a local sweet pepper variety, during five cultivation cycles.

In general the calculated heritability based in the parent/descend regression was high for yield as for the other characters, so the progress in the transmission of these characters was possible through the developed breeding program.

Due to the self - crosses made, the lines became homozygous, the variability within them decreased but the variability among the lines increased so the coefficient of heritability increased (Table 1).

Table 1.

COEFFICIENT OF HERITABILITY ESTIMATED

	Years.				
	1979/1980	1980/1981	1981/1982	1982/1983	1983/1984
Number of fruits/plant Hetitability	0,6050 ±0,1004	0,5103 ±0,1102	0,5921 ±0,1003	1,0 ±0,0352	1,0 ±0,0272
Fruit mean weight Heritability	0,9654 ±0,0807	0,71502 ±0,0489	0,70476 ±0,04003	1,0 ±0,0098	1,0 ±0,0113
Yield/plant Heritability	0,6580 ±0,1334	0,7278 ±0,1826	0,5665 ±0,19272	1,0 ±0,0335	1,0 ±0,0328
Plant Width Hetitability	0,9760 ±0,0171	0,9667 ±0,0156	0,71625 ±0,1034	1,0 ±0,0224	0,8489 ±0,0223
Fruit Length Hetriability	0,8504 ±0,00906	0,3837 ±0,1088	0,6756 ±0,1583	0,9625 ±0,0595	1,0 ±0,0478
Fruit Width Hetitability	0,8000 ±0,0948	0,2317 ±0,1135	0,3982 ±0,11341	0,8396 ±0,0785	0,6331 ±0,0832
Pericarp thickness Heritability	0,3660 ±0,1234	0,41157 ±0,1418	0,5014 ±0,1340	1,0 ±0,0157	1,0 ±0,0193
Plant height Heritability	0,4543 0±,1341	0,8267 ±0,04	0,5837 ±0,1102	1,0 ±0,0218	0,9938 ±0,0134

SELECTION OF PROMISING LINES IN PERENNIAL CHILLI (Capsicum frutescens)

Capsicum Newsletter, 6 (1987), 45-46

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Almost all the varieties cultivated on field scale in India belong to Capsicum annuum. They are usually early maturing and are grown as annual. The fruits of these varieties show much variability in size and are less pungent than perennial chilies. The perennial chilli varieties are characterized by the small size of the pod, highly pungent and are rarely cultivated on field scale and are known as 'bird chillies' (C. frutescens). They are short lived perennial with average plant height of 0.5-1.5 meter and living 2 or 3 years. The production of the 'bird chillies' is rather limited because of poor yields and difficulty in harvest. It has been observed that in many regions chilli growers like to keep the crop for more than one season. Realizing the value of perennial chillies efforts have been made to select superior lines in different populations of 'bird chillies'.

PSP-11 is a promising line with high degree of mosaic and leaf curl resistance, perennial habit, erect and compact plant type with high yield potential. There is no other perennial chillis grown on field scale PSP-11 was therefore evaluated for yield potential with high yielding annual cultivars, the yield evaluation data is shown in Table-1. The new line bears fruits in clusters of 6-9 fruits which can be picked at one go and reduces the labor cost. PSP-11 is of value as a labor, saving device since in future gradually decreasing labor will be available in India for agricultural operations. The fruits of PSP-11 line are upright and are 5-6 cm. and in length. Pusa Jwala chilli cultivar is a source of ideal raw material for manufacture of oleoresin export from India. PSP-11 is a superior quality line with 12% capsaicin content in oleoresin as compared to 7.5-8.5% in 'Pusa Jwala'.

TABLE 1. Yield evaluation test New Delhi, 1986-87.

Variety/Line	Dry fruit yield July-Dec. 1986 Q/ha	Dry fruit yield* July-April, 1986-87. Q/ha	Total fruit yield Q/ha
PSP-11	2.19	2.79	4.98
PC-1	2.19	-	2.19
NP 46-A	1.83	-	1.83
'Pusa Jwala'	2.05	-	2.05

*All the cultivars being annual stopped fruiting, only PSP-11 being perennial fruited to yield in summer. The fruit yield was usually low because of low rainfall in the season.

Capsicum Newsletter, 6 (1987), 47-48

A STUDY OF HYBRID VIGOLIR IN CHILLIE (CAPSICUM ANNUUM L)

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Heterotic effects on yield and other characters were studied in five F_1 hybrids involving five varieties of Capsicum annuum. Table 1 shows the extent of heterosis based on the hybrid performance over its mid-parent value and also over its higher parent value. All the hybrids out yielded their respective mid-parent values, with two crosses, namely 'Irian' x CM 31 and CPK x 0110-1 showed significant heterosis. Heterosis in yield was primarily due to the number of fruits per plant whereas other yield components were relatively low and some of them were below the mid- parent value.

It was also observed that the F_1 hybrids produced comparatively less flowers as indicated by the general trend of negative heterosis. However, amazingly most of the hybrids expressed relatively high heterosis on the percentage of fruit set, resulting in greater number of fruits per plant.

The negative heterosis in the days to flowering and days to first harvest indicates earliness in flowering and maturity. The F_1 hybrids also showed greater uniformity in these traits.

Both hybrids and parents showed a similar sigmoid growth curve. However, three hybrids namely CPK x 0110-1, 0110-1 x 'Irian' and 'Irian' x CM31 outgrew their respective taller parents in all stages of growth. The hybrid CM31 x 146 expressed intermediate growth compared to their parents whereas for 'Iran' x 146, the growth of F_1 resembled variety 146 very closely.

Table 1. Heterosis effect of the various characters measured in five F_1 hybrids of Capsicum annuum.

F_1 hybrids	0110-1x 'Iran' Heterosis (%)		CM-31 x 146 Heterosis (%)		'Iran' x 146 Heterosis (%)		'Iran' x CM-31 Heterosis (%)		CPK x 0110-1 Heterosis (%)		Mean value	
Characters	MP	HP	MP	HP	MP	HP	MP	HP	MP	HP	MP	HP
Yield per plant (g)	2710	4.14	34.71	-6.69	38.73	-1.38	33.67	27.89	40.36	22.86	34.91	9.36
Plant height at maturity (cm)	2.46	0.17	-2.34	-13.99	10.15	-1.35	7.40	5.38	6.65	3.74	4.86	-6.05
Number of fruits/plant	-5.26	-25.00	125.00	63.64	33.33	14.29	55.56	27.27	40.74	26.61	49.87	31.37
Weight per fruit (g)	6.00	-30.99	-41.95	-43.61	-20.40	-35.85	-27.18	-42.59	-3.29	-10.60	-17.36	-32.73
% of fruit set	-29.80	-51.47	142.22	50.00	32.48	10.21	48.03	0.61	16.78	5.72	41.94	3.01
Number of flowers/plant	-4.68	-5.56	-16.85	-24.49	20.39	14.81	-23.40	-33.33	11.32	11.32	-2.64	-7.45
Number of seeds/plant	28.03	-6.16	0.00	-0.90	-17.65	-28.05	-6.61	-17.81	67.79	54.32	14.31	0.44
Fruit length (cm)	5.7	-0.37	-21.46	-21.71	111.32	99.17	4.31	-1.39	18.58	0.36	22.69	15.21
Fruit width (cm)	-2.92	-25.75	-2.70	-3.25	-3.09	-18.28	-14.07	-26.87	3.01	-1.91	-3.95	-15.2
Thickness of fruit wall (cm)	9.80	-12.50	-11.11	-13.04	-12.73	-25.0	-14.81	-28.13	5.26	5.26	-6.82	-14.68
Days to flowering	-2.13	4.55	-2.74	1.43	-5.96	-5.33	-0.69	2.86	-1.45	3.03	-2.59	1.31
Days to first harvest	-3.39	1.79	-4.49	-0.85	-4.38	-3.23	0.83	3.39	-3.08	-1.79	-2.90	-0.144

MP – midparent value
HP – higher parent value

RESULTS OF THE COMBINED ABILITY STUDIES IN SWEET PEPPER (Capsicum annuum L.)

Capsicum Newsletter, 6 (1987), 49-50

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Analysis is of combining ability provides guidelines for early assessment of the relative breeding potential of parental material. It also helps the breeder in identifying the best combiners, which maybe hybridized either to exploit heterosis or to build up the favorable fixable genes. In the present study (diallel Set of 9x9 F_l and F_2 crosses of the material planted as reported by Joshi, 1986) both additive (gca) and non-additive (sca) gene actions were important in the expression of ete characters studied (table). In general additive type of gene action appeared to play a greater role, suggesting effectiveness of selection and much faster improvement in economic characters. It was observed that good combiners for a trait also give good combiners performance, but it is not always true, therefore, it is suggested that gca estimates and perse performance of a cultivar should be taken together for assessing its breeding value. For a realistic opinion of good general combiners diallel analysis is also carried out in F_2 crosses. The characters that determine the biological value can be improved by developing pure lines form the crosses of parents having high gca and high per-se performance. This may be expected that these crosses will produce some transgressive segregates in later generations with desired traits. This suggests that for caps ictn improvement parents HC-201, 'Golden Queen,' 'Vinedale', 'Ruby King' and 'lob Wonder' may be used in hybridization programme followed by Selection of desirable lines in segregating generation. Further as
table the crosses with high sca and high heterosis cancer for commercial cultivation under Almora (temperate regions) conditions, as utilization of hybrid vigor is feasible in this crop (Josh, 1986).

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Table 1. Best parent, best F1 and best general combining parent and the best specific cross combination for different characters.

Character	Best parent	Best F1	Best general comviner	Best specific cross combination
Days taken to 75% flowering	RK, 209	210 x 201, 209 x 201	BN, CW	210 x 201, 210 x GQ
Plant height	CW, 201	BN x 201, YW x BN	CW, BN, 201	BN x 201, YW x BN
Number of primary branches	BN, 201	210 x BN, 209 x RK	V, YW	209 x RK, 210 x BN
Days to first picking	201, V	BN x 201, YW x BN	201, V, YW	GQ x BN, 209 x BN
Length of the fruit	V, GQ, YW	RK x YW, 210 x V	V, YW	RK x YW, YW x 201
Early yield per plant	201, GQ	GQ x BN, GQ x V	GQ, V, 201	GQ x BN, 209 x RK
Circumference of the fruit	GQ, 201	RK x GQ, GQ x 201	RK, GQ	RK x GQ
Number of fruits per kg.	210, 201	209 x GQ, GQ x 201	GQ, 201	209 x GQ, 209 x BN
Average fruit weight	210, RK	209 x GQ, GQ x 201	GQ, 201	209 x GQ, GQ x 201
Number of fruits per plant	201, GQ	209 x RK, BN x 201	201, RK	209 x RK, 210 x RK
Fruit yield per plant	201, GQ	BN x 201, 209 x RK	201, RK	209 x RK, 210 x YW

RK = 'Ruby King'
209 = HC-209
CW = 'California Wonder'
BN = 'Bullnose'
201 = HC-201
210 = HC-201
V = 'Vinedale'
YW = 'Yolo Wonder'
GQ = 'Golden Queen'

EXISTENT OF HETEROSIS RETENTION AND GENETIC VARIABILITY IN SEGREGATING GENERATION IN CAPSICUM.

Capsicum Newsletter, 6 (1987), 51

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Heterosis retention teas calculated in sweet pepper as the percentage decrease in F_2 over F_1 generation for ten quantitative characters and genetic variance heritability were calculated for 36 F_2 hybrids for four yield contributing trait in the experimental material planted in April, 1981 (Joshi, 1986). The results showed significant inbreeding depression for all the characters except days to 75% flavoring and first picking. Generally inbreeding depression for yield was observed in those crosses, which exhibited inbreeding depression in any of the yield components. The hybrids shoving high heterosis for yield also manifested significant inbreeding depression of yield indicating a dom1n~it type of gene action for this trait. However, the values obtained for heterosis were greater than those for inbreeding depression indicating the role of additive x additive interaction in the manifestation of heterosis. In the hybridization programme aimed at yield Improvement the breeder can look for such a combination which shows high mean yield, high heterosis in F_1 and its retention in F_2 germination. The farmers of temperate regions (Almora Condition) can use the crosses HC-210 x 'Yolo Wonder', ' Ruby King' x 'California Wonder' and 'Ruby King' x 'Golden Queen' which were found promising with high mean yield, high heterosis in F_1 and its retention in F_2 generation.

High genetic variability was observed in 12 generation for a711 the four characters studied. The highest and lowest estimates of hetiability were observed in those crosses, which have respectively highest and lowest genotypic variance. It is suggested that selection In advance generations will be more effective in the crosses with high variance and high heteriability.

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Capsicum Newsletter, 6 (1987), 52-53

HETEROSIS POTENTIAL IN HOT PEPPER (CAPSICUM ANNUUM L.)

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Hybrid has a great role in boosting yield in almost every crop. In hot pepper, however, not a single F_1 hybrid has so far been released in India. Hybrid seed production through artificial emasculation and crossing is very costly affair. With the development of three male sterile lines (Singh and Kaur, 1986) possessing multiple disease resistance. Thirty-three F_1 hybrids were produced by using 11 important male parents in 1986 and a yield trial was conducted in 1987. The seedlings were transplanted on February 18, 1987 and picking of green and red ripe fruits started on May 14 and June 12, respectively and continued up to September 9, 1987. Only some of the outstanding hybrids have been discussed in this paper. Green yield varied from 987.5 to 1645 g/plant in hybrids. Maximum green yield was found in MS x 1965 g/plant in hybrids. Maximum green yield was found in MS_{12} x S_{27} which gave 70.9 per cent more than male parent and 235.71 per cent than standard variety (Table 1). Red ripe fruit yield varied from 664.0 to 905 g/plant. MS_{13} x S_{27}, MS_{12} X S_{27}, MS_{12} x 1535, MS_{41} x Albena, MS_{12} x LLS gave excellent results in red ripe fruit production. Although there was lot of variation in increase of red fruit yield of F_1 hybrid over male parent due to lowest yield of 'BG-l' but increase over standard variety varied from 74.45 to 137.76 per cent indicates the great scope of growing F_1 hybrids in this crop.

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Table 1. Performance of F_1 hybrids in hot pepper

Hybrids	Green yield per plant (g)	Per cent increase over		Red yield per plant (g)	Per cent increase over	
		Male parent	Standard parent		Male parent	Standard parent
MS12 x S27	1645.0	70.9	235.71	893.75	115.36	134.80
MS13 X S27	1500.0	55.8	206.12	905.00	118.07	137.76
MS12 X 1535	1157.0	96.3	136.12	827.50	302.42	117.40
MS41 X 'Albena'	1525.0	78.2	211.22	856.25	82.67	124.96
MS12 x LLS	1188.0	125.21	142.45	825.00	265.64	116.75
MS 12 x 'Hatvani'	987.5	72.48	101.53	708.75	99.64	86.20
M13 x BG-1	1285.0	2143.78	162.24	644.0	10524.0	74.45
S27	962.5			415.00		
1535	589.3			205.63		
'Hatvani'	572.5			355.00		
'Albena'	856.0			468.75		
'Punjab Lal' (standard)	490.0			380.63		
'Ladhiana Long' Selection (LLS)	527.0			225.63		
BG-1	57.0			6.25		

Capsicum Newsletter, 6 (1987), 54-55

BREEDING HOT PEPPER FOR COLOR

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Bright red color and its retentively on storage is an important marketable character for hot pepper. In the world trade, Huntaka' and 'santaka' varieties of Japan are famous for their color but their yield potentiality is low when compared to the local strains. Breeding programme was carried out to combine the yield of 'G3' strain and attractive red color of Huntaka chilli. A line LCA 206 has been selected as it possess retentive bright red color of Huntaka and fruit size and yield potentiality of 'G3'. LCA 206 is characterized by elongated main branches and condensed secondary and tertiary branches with chain bearing nature and yield potentiality of 75 Q/ha (dry chilies). The fruits are light green, less pungent and ripe fruits rosy red in color. It is in minikits and all India coordinated varietal trials showing good promise.

Literature:

Sri rama Chandra Murthy, N. and J.N. Bavaji: 1978 High yielding chilli strains with wide adaptability.
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COORDINATED VARIETAL TRIALS (RAINFED CROP)

S.No.	CULTIVAR NO.	Dry pod yield in Kg./hectre	
		1985-‘86	1986-‘87
1.	LCA 235	1381	2538
2.	LCA 206	1852	2519
3.	Musalwadi	1349	2341
4.	Jawahar – 218	1284	2481
5.	B.R. Red	1701	2261
6.	Sel. 1	1349	2489
7.	CA 586	1271	2053
8.	CA 618 – 126	1216	2013
9.	KCS – 1	1217	2430
10.	K. 2 Check	1451	2419
11.	G4 Check	1645	2241

Capsicum Newsletter, 6 (1967), 56-57

A STUDY OF SWEET PEPPER YIELD AND QUALITY

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Sweet pepper yield and quality was studied during 5-year-trials using once-over harvest. The years 1923 and 1986 were found to be more favorable for direct sowings.
In 1982 and 1984 higher yields were obtained after raising sweet pepper transplants, and in 1985 the yields were not influenced by the growing method used. With direct sowing the average yields were ranging between 10.88 $t.ha^{-1}$ and 23.15 $t.ha^{-1}$ in respective years, and those from transplants between 10.06 $t.ha^{-1}$ and 21.49 $t.ha^{-1}$.
With direct sowing out of 39 domestic and foreign cultivars as well as breeding lines observed ovs. Karmen, KS/l-80, Morava, Podarok Moldavy , CE-PM0, CE-VKT, ‘Granat’, Jubilantka’, ‘Klenot’, ‘Konika’, ‘Perle’, ‘Jubile’, KV-CN, ‘Granova’ a KV-RNaopeared to be the most successful. Cvs. ‘Klenot’, KS/1-80, KV-CN, ‘Jubi1a’, ‘Citrina’, ‘Granat’, ‘Konika’ Granova’, KV-RN, ‘Morava’, ‘Perle’ and CE-VKT excelled in yields when grown from transplants. The results indicate that Czechoslovak cultivars and breeding lines /Valsikova 1983, 1985/ achieving best results are most adapted to our conditions. In the years favorable for warm-weather fruit vegetables it is possible to grow successfully most of domestic cultivars from direct sowings in southern Slovakia. There is a need, however, to take into account low proportion of 1st class quality fruits of physiological maturity as ‘compared with traditional growing method.

Yield and quality of sweet pepper Tab. 1

Pionter	Direct sowing					From transplants				
	1982	1983	1984	1985	1986	1982	1983	1984	1985	1986
Average yield I.+II. Class quality /t.ha-1/	13,29	23,15	10,88	21,99	18,98	20,12	21,01	15,59	21,49	10,06
Proportion of green fruits from yield /%/	22,87	12,27	78,81	-	18,48	16,86	11,03	24,44	23,78	23,66
Proportion of I.class quality from yield /%/		67,42	45,20	61,48	37,39	69,64	57,36	50,61	68,46	55,96
Average weight of fruits /g/	86,68	68,16	-	108,45	50,08	101,66	90,40	-	124,33	57,54
Average length of fruits /mm/	89,49	77,14	-	93,99	65,76	95,46	81,76	-	93,75	74,26
Average width of fruits /mm/	57,06	52,03	-	61,07	45,49	59,17	52,07	-	62,47	48,40

EVALUATION OF GENTIC PARAMETERS OF SELECTED FEATURES OF SWEET PEPPER FRUIT (CAPSICUM ANNUUM L., cross cul.TOMATICOT GIALLO AND POZNANSKA SI~ODKA)

Capsicum Newsletter, 6 (l987),58-59

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The paper contains partial results, of an experiment concerning variability and way of inheriting some features of sweet pepper (Capsicum annuum L.) carried out in the Department of Agricultural Plant Breeding of Poznañ Agricultural Uniwersity during the years 1983/86 (Andrzejewski, doctorial dissertation). Initial experiment material constituted two cultivars: 'Italian Tomaticot giallo' (T.g.) and 'Polish Poznanska Slodka' (P.S.). In 1966, among others, six following generations were analyzed: Tg., P.S., T.g. x P.S.- F_1, /T.g. x P.S./ x T.g., /T.g. x P.S./
x P.S., T.g x P.S.,- F2 . This experiment was carried out in two environments (foil tunnel, field) in randomized block system in four replications. Seventeen features were observed connected with description of fruit, yield structure and description of plants of which this work presents three features, namely: mass, length and width of fruits.
By means of different statistical methods (single-variable and multivariable ones) general characteristics of examined generations were evaluated with determining means and variance (Table 1). Comparison of these generations was made with respect to all analyzed features together and separately. During verification of the hypotheses concerning interesting - contrasts between the generations, so called simultaneous test procedure was applied. Genetic analysis based on determining evaluations of genetic parameters concerning additive action of genes (d), domination (h). and non-allelic interaction homozygote x homozygote Ci), homozygote x heterozygote Ci), heterozygote x heterozygote (1) (Mather,Jinks.1962) was carried out separately for each parameter
Assessment of these parameters is given in Table 1. Significant differences between the results of tunnel and fields experiments were not observed. The effects of additive action of genes are significantly positive for mass and width of fruits (on the level< 0, 05) for both experiments (tunnel field). Evaluations of other parameters are more significant in the tunnel experiment.

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Table 1. Means of variance and evaluation of genetic parameters of sweet pepper cross. Tomaticot giallo x 'Poznanska Siodka'

Foil tunnel

Generations	No. of plants	Mass fruits Plants (g)		Length fruits (cm)		Vidth fruits (cm)	
		x	v	x	v	x	v
TG	22	161.40	36.32	5.44	0.0023	9.08	0.042
TG x PS F1	24	106.10	8.65	7.57	0.021	7.54	0.012
(T9 x PS) x TG	40	100.81	18.89	6.95	0.042	7.56	0.023
(TG x PS) x PS	40	73.55	2.82	9.74	0.23	5.92	0.012
TG x PS F2	52	95.94	9.34	7.65	0.12	7.06	0.014
PS	23	51.78	2.75	12.97	0.072	4.49	0.003
Evolution	M	141.63 ±	15.69	7.63 ±	1.74	8.07 ±	0.54
of genetic,	[d]	54.81 ±	3.13	-3.77 ±	0.15	2.30 ±	0.10
Parameters	[h]	-147.23 ±	38.42	1.36 ±	4.20	-3.49 ±	1.35
And their	[i]	35.04 ±	15.37	1.58 ±	1.73	-1.28 ±	0.53
Standard	[j]	-55.10 ±	11.22	1.95 ±	1.08	-1.31 ±	0.40
Deviations	[k]	111.70 ±	23.88	-1.41 ±	2.53	2.97 ±	0.85

Field

Generations	No. of plants	Mass fruits Plants (g)		Length fruits (cm)		Vidth fruits (cm)	
		x	v	x	v	x	v
TG	21	52.99	17.21	4.02	0.01	6.31	0.03
TG x PS F1	20	50.50	11.79	5.76	0.06	5.85	0.02
(T9 x PS) x TG	43	59.13	5.28	5.62	0.03	6.06	0.01
(TG x PS) x PS	43	38.41	2.78	7.11	0.10	4.80	0.01
TG x PS F2	52	53.61	4.67	6.55	0.07	5.70	0.02
PS	21	25.03	3.28	8.79	0.11	3.69	0.01
Evolution	M	58.37 ±	10.59	7.14 ±	1.29	6.04 ±	0.64
of genetic,	[d]	13.98 ±	2.26	-2.39 ±	0.17	1.35 ±	0.10
Parameters	[h]	-11.17 ±	25.44	-0.99 ±	3.08	-1.17 ±	1.45
And their	[I]	-19.36 ±	10.34	-0.74 ±	1.28	-1.08 ±	0.63
Standard	[j]	13.48 ±	7.26	1.79 ±	0.80	-0.19 ±	0.35
Deviations	[k]	3.30 ±	16.48	-0.39 ±	1.89	0.98 ±	0.87

TG – 'Tomaticot giallo'

PS – 'Poznanska Syodka'

A progress in breeding for resistance to CMV in pepper

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Capsicum Newsletter, 6 (1987), 60

In a previous report (Shifriss and Cohen 1986) we hypothesized that resistance to CMV is linked with genes responsible for small fruits. Following second backcrossing to a "Bell" type cultivar, BC2F2 we received few resistant individuals all with small fruits. Continuous breeding work, i.e. third backcrossing generation BC3F2 and a study of 462 individuals from the original cross suggest reservation from the previous "linkage" hypothesis.

Following the third backcrossing we received resistant plants with fruits much larger than those obtained in previous generation. In addition among 462 F_2 individuals from a cross between CMV resistant and susceptible parents the heaviest fruited plants carried fruits of 20 g while those with lightest fruits showed 8 g per fruit. No single individual approached the original parents in fruit weight (the CMV resistant and susceptible parents had fruits of 1 g and 150 g respectively).

Hence fruit weight and size depend on large number of genes not necessarily linked with these traits like resistance to CMV. Further backcrossing is suggested for improving fruit size.

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Capsicum Newsletter, 6 (1987), 61-62

BREEDING SWEET PEPPER RESISTANT TO CUCUMBER MOSAIC VIRUS

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In Japan, China and other Asian countries, the most important diseases of sweet and hot peppers are TMV, TMV-Pepper strain, CMV and so on The resistant lines to TMV and TMV-P have been found and these are used in the procedure of breeding. But the resistant lines to CMV have not been found in Asian countries. Now in NIVOT breeding sweet pepper resistant to CMV are started and the authors have got some in formations.

The authors dealt with two experiments, one is the study on the resistance to CMV of commercial cultivars of C. annuum and one line of C. baccatum (LS 340' introduced from French) and the other is on resistance of CMV different between Capsicum species, namely 27 lines of C. annuum, 5 C. baccatum, 4 C. pubescens, and 1 C. chinense.

The testing methods applied here are as follows; After CMV preserved in NIVOT was multiplied on plants of Micotiana glutinosa, upper leaves were collected and grined with buffer solution of 1/15 H phosphoric acid and filtered, which was solution for inoculation. CMV was inoculated on the second foliage leaf of peppers. 10 days after inoculation, the grade of mosaic (M), yellow (Y), and growth (G) were observed.

Results: Although there were some differences in the grade of H, Y, and G between cultivars, it was suggested that there was no difference between cultivars. On the plant of'LS 340'a little mosaic and yellow were observed but it seemed more resistant than C. annuum cultivars. Difference of resistance between species are shown in Table 1. Sane lines of C. annuum and C. baccatum were of low grade in N and Y but later they were severely damaged. So C. annuum and C. baccatum tested here were not resistant to CMV. Four lines of C. pubescens tested were more resistant than other species, especially 'LS 1659' introduced from Bolivia, South America was a little damaged by CMV and seemed a highly resistant line.

Through the cross ability tests by many researchers the crossing between C. annuum and C. pubescens is very difficult. Now the authors are planning to make the crosses between C. frutescens and C. pubescens, to introduce the resistance to C. frutescens, and to make the crosses between C. annuum and the resistant C.frutescens.

Table 1. Difference of resistance between Capsicum species

No.	Arranged No.	Species	Intro. From	Grade of M	Y	G
1.	LS 1609	C. annuum	Mexico	58	39	30
2.	LS 1610	"	"	50	22	35
3.	LS 1612	"	"	62	46	7
4.	LS 1613	"	"	73	40	9
5.	LS 1614	"	"	59	46	27
6.	LS 1630	"	Israel	44	68	0
7.	LS 1631	"	Bolivia	64	58	28
8.	LS 1658	"	"	66	60	51
9.	LS 1660	"	"	73	18	39
10.	LS 1621	C. baccatum	Mexico	72	42	53
11.	LS 1637	"	Peru	75	75	18
12.	LS 1638	"	"	55	75	0
13.	LS 1655	"	Bolivia	65	38	2
14.	LS 1656	"	"	66	56	34
15.	LS 1650	C. pubescens	Peru	60	30	8
16.	LS 1659	"	Bolivia	49	9	5
17.	LS 1663	"	"	52	20	3
18.	LS 1716	"	?	52	32	11
19.	LS 1639	C. annuum	Peru	69	26	29
20.	Shosuke	C. annuum	Japan	54	57	46
21.	New Ace	"	"	65	68	11

Index of M: 0(No mosaic) ~ 4 (severe mosaic)

Y: 0 (green) ~ 4 (yellow)

G: 0 (healthy) ~ 4 (extremely dwarf or dead)

Grade = (Sum of Inde)/ (4 x No. of plants observed) x 100

Capsicum Newsletter, 6 (1987), 63-64

CUCUMBER MOSAIC VIRUS RESISTANCE IN CAPSICUM ANNUUM L. -AN UPDATE

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In a later screening following our report by Cuevas and Nicklow (1) we obtained 7 F_3 progeny within P.1. 286419 to be 100 percent "resistant" and is reported in Table 1.

Of the 7 evaluated to be "resistant" to the Massachusetts strain of CMV, each was used to inoculate with the California strain of CMV. A repeated test, using the Massachusetts strain of CMV, to reconfirm resistance would have taken place during the fall and winter of 1986-87 but, due to a few extremely hot days during the summer of 1986, the Massachusetts strain of CMV was lost. Therefore, a substitution was made using the California strain of CMV to determine if there is a difference between the two strains or if indeed there were two different strains. As we had self's of quite a few "resistant" plants from the above reported test, 12 plants of each of the F progeny were inoculated and results are indicated in Table 2.

Since all plants in each of the progeny acquired the virus, this gives preliminary information that the California strain of CMV behaves differently than the Massachusetts strain as reported in Table 1. It is acknowledged that both strains should have been evaluated at the same time but this was not possible. Our conclusion to date is that these are indeed 2 different strains of CMV, as our P.1. 286419 progeny shows "resistance" only to our Massachusetts strain.

(1) Cuevas, J. R. and C. W. Nicklow, 1985, Cucumber Mosiac Virus Resistance in CAPSICUM annuum L. Capsicum Newsletter, 4, p. 48

Table 1. Restuts of inoculating plants of 15 progeny and a check of cultivar 'Midway'. Resistant progeny are indicated.

Progeny	Number of plant with virus/ Number of plants inoculated	"Resistant"
A2#10	1/13	
A4#	0/11	Yes
A2#	1/14	
A4#	2/13	
A6#	0/15	Yes
A5#	0/15	Yes
A6#	0/13	Yes
A4#	0/13	Yes
A3#	2/13	
A5#	9/15	
A6#	1/14	
A3#	1/13	
A6#	0/16	Yes
A6#	2/39	
A4#	0/15	Yes
'Midway' Cultivar (check)	30/30	

1/ Each plant was inoculated at least two times following the fifth true leaf. "Resistant" are those plants showing no virus symptoms.

Table 2. Number of plants infected with the Calif. Strain of CMV. (No. of progeny inoculated within an entry is indicated in parenthesis).

Progeny	Number of plants with virus/Number of plants inoculated	
A6#8(14)'Midway cultivar'	168/168	12/12
A4#6(13)'Midway cultivar'	156/156	12/12
A5#5(15)	180/180	
A6#6 (10)	120/120	
A4#7(15)'Midway cultivar'	180/180	12/12
A4#11(11)'Midway cultivar'	132/132	12/12
A6#7 (13) 'Midway cutivar'	156/156	12/12

1/ All plant showed CMV symptoms

STUDIES ON BIOLOGICAL CONTROL OF PHYTOPHTHORA CAPSICI ON PEPPER

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Capsicum Newsletter, 6 (1987), 65

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Several isolates of Chaetomium sp., Coniothyrium sp., Gliocladiuiu sp. and Trichoderma sp. were tested against Phytophthora capsici L. in laboratory and glasshouse trials. The best results were obtained with one (MA-19) of the thirty isolates of Trichoderma that were used.

The volatile products of MA-19 reduced 65% of the growth of P.capsici on V-8 agar after 7 days at 21±1 °C and completely inhibited its sporulation.

Glasshouse four-leaf stage pepper plants were inoculated at the crown level with the antagonist. The fungus was cultivated on PDA in 10 cm Petri dishes. After ten days of growth the content of one dish was suspended in 200 ml of tap water; 10 ml Of the suspension were distributed around the crown of each plant. After 7-10 days the plants were inoculated with P.capsici. The pathogen was grown on V-8 agar in 10 cm Petri dishes for 7 days; one dish was suspended in 4000 ml of tap water and 10 ml of this suspension were used per plants.

In the first week the mortality of the plants pre-inoculated with MA-19 was reduced to 50% compared to the control plants.

INTERACTION BETWEEN FOUR VIRUSES AND PHYTOPHTHORA CAPSICI ON PEPPER

Capsicum Newsletter, 6 (1987), 66-67

G.CristiflZiO and C.D'AmbrosiO

Institute of Plant pathology - University of Naples Via Università, 100-80055 Portici (NA) - Italy -A susceptible pepper cultivar "Comb di toro rosso" was used to study the interaction between virulent strains of CMV, PVX, PVY, TMV and Phytophthora capsici L. Trials were carried out in a glasshouse at 25-30 ^{0}C on young 2-4 truth-leaf plants.

Seven and fourteen days after the virus's inoculation, the fungus was inoculated at crown level using 10 ml per plant of a standard mycelial suspension (a seven-day old colony suspended in 1000 ml of distilled water). Results were observed seven and fourteen days after the fungus inoculation.

Table 1 shows that the pre-inoculation of CMV, PVX and PVY increases susceptibility of the plant in opposition to TMV, which decreases it. However TMV decreases the susceptibility of the plant only when the fungus is inoculated at a seven days interval. A similar effect of TMV on pepper was found by Bansal et al. 1978 toward the causal organism of anthracnoSe, Colletotrichum capsici (Syd.) Butler and Bisby.

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GIL ORTEGA R., PALAZON ESPANOL C. and CUARTERO ZUECO J., 1986, Response of pepper to the intravarietal selectio for resistance to Phytophthora capsici. 5th Eucarpia Meeting on Capsicum and Eggplant, Zaragoza (Spain), p. 141-144.
POCARD E. and DAUBEZE A.M. 1980, Recherche et evaluation des composantes d'une résistance polygenique: la résistance du piment à Phytophthora capsici. Ann.Amélior. Plant. 30 (4), p. 377-398.

Figure 1(1). Evolution of P. capsici mycelial growth rate (mm/week) on several pepper genotypes at two different days lengths (16 and 9 hours). Temperature 20C

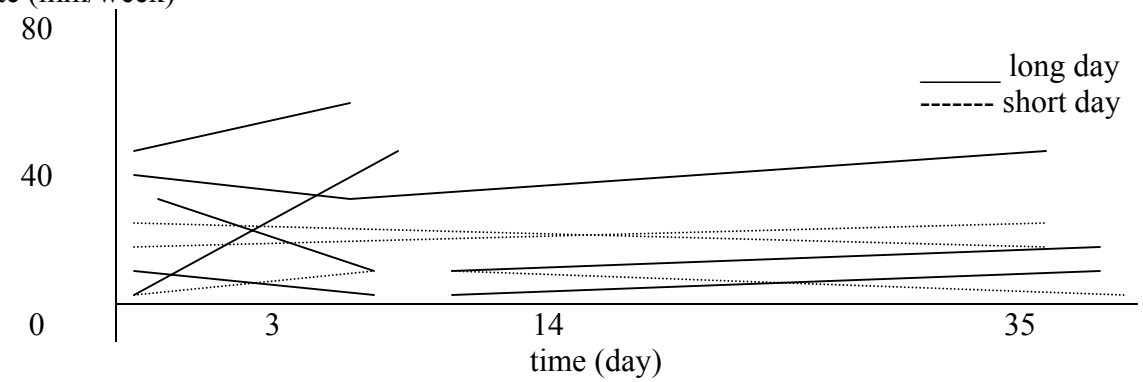
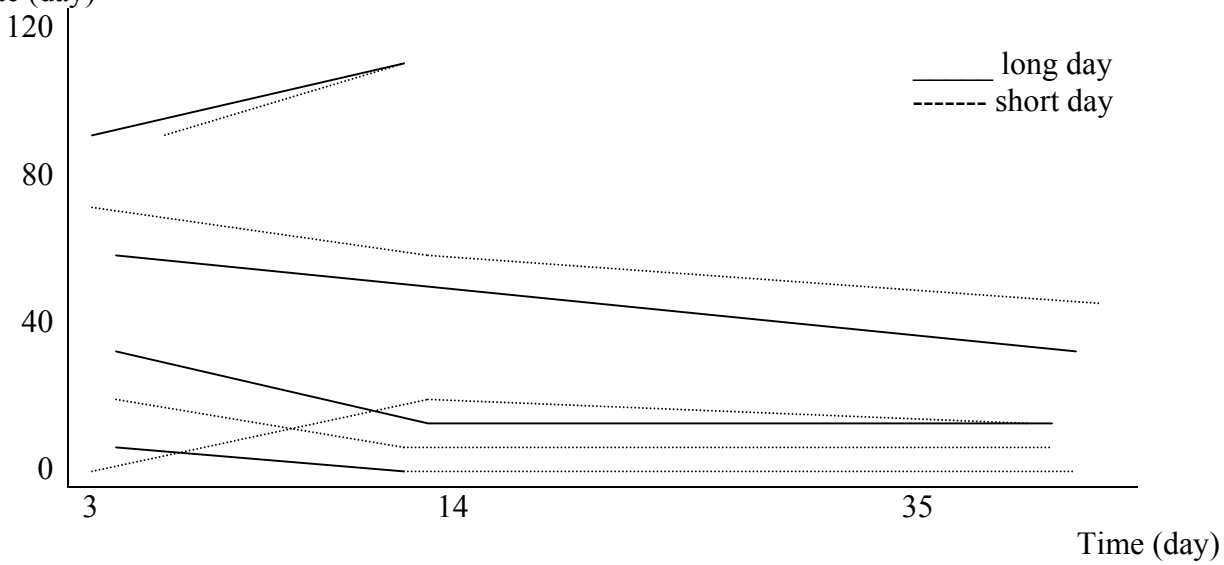


Figure 2(1). Evolution of P. capsici mycelial growth rate (mm/week on several pepper genotypes at two different days lengths (16 and 8 hours) Temperature 30C



(1) Abreviations used for pepper materials:
I224 = INIA 224
SP/BL = Susceptibles Plants of Breeding Lines
RP/BL = Resistant Plants of Breeding Lines
PI = PI 201232

SEARCH FOR CAPSICUM ANNUUM SUSCEPTIBILITY TO FUSARIUM

Capsicum Newsletter, 6 (1987), 70
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Diseases cause serious damages in pepper (Capsicum annuum L.) in Cuba. In order to study the origin of some symptoms as yellowish in plants and yield lack that became to appear in pepper areas encreasingly, we started a search in order to find out the casual patogen of these symptoms.

> 19 peppers varieties were sown in semicontrollated conditions (isolated) using a mix of soil and organic matter (3:1) this was sterilized with methyl bromide. Seedlings at 2-3 true leafs, separated in two groups, were submerged in a condium suspension (108 ufc/ml) of Fusarium solani and Fusarium oxysporum pv lycopersici and then transplanted in soil. (Laterrot, 1984).

Three weeks later the searched symptoms appeard. Some cultivars as 'Keystone Resistant Giant', 'Mild California Wonder' and 'Export' were susceptible to Fusarium solani while 'Bell Boy', 'Citrina', 'Chay', 'New Ace', 'Regalo de Moldavia', 'True Hear' and 'Vesna' were susceptible to Fusarium oxysporum pv lycopersici. 'Hungarian Sweet Wax' was susceptible to both pathogens. The technique used to study host resistance was developed by Wellman, (1939) and modified by Mitov et al, (1973).

Laterrot H. 1984. Comunicacion personal.

Mitov N. et al. 1973. Resistancia de variedades de tomate al Fusarium oxysporum f. lycopersici (Sacc) snyder y Hansen. Rev. Agricultura. Ano VI, 2:52.

Wellman F.L. 1939. A technique for studying host resistance and patogenicity in tomato Fusarium wilt. Phytopatology. Vol. 29, 11:945.

Capsicum Newsletter, 6 (1987),71-72

DEVELOPMENT OF A SCREENING TECHNIQUE FOR RHIZOCTONIA SOLANI ON PEPPER SEEDLINGS (CAPSICUM ANNUUM)

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Most pepper (Capsicum annuum cultivars are susceptible to the fungus Rhizoctonia solani which causes pre- and post-emergence damping-off, seed decay, stem canker and root rot (1,2,4). This pathogen may invade seedlings through wounds or when planted in clay and/or saline soils (1). R. solani is becoming a problem in New Mexico as pepper production expands into clay soils. A study to determine the feasibility of screening peppers for resistance to R. solani was undertaken.

R. solani was grown on autoclaved corn kernels for two weeks(2). Two inf~esi~j kernels were placed in each planting cel 1 (4 x 2.75 x 5.5 cm). The pepper seedlings were divided into two groups. One group was inoculated at planting and the other was inoculated at the 4 to 6 true leaf stage.

The seedlings were scored 45 days after inoculation using an interaction phenotype scale of 0-9, where 0= healthy roots with light brown color, 1 = dark brown roots, 3 = distorted tap root, 5= death of tap root but with secondary roots, 7 = stem girdling and necrosis, 9 = death. A disease index (D.I.) was calculated 'from the formula: D.I. = sum (ixj)/n , where "i" is the interaction phenotype class, "j" is the no. of plants in each class, "n" is the total no. of plants.

Table 1 shows all of the R. solani isolates caused significant disease as compared to the uninoc6-lai-e-d -control when the pathogen was added at seeding. Table 2 suggests five R. solani isolates were most virulent causing high disease indices. rour isolates (i.e. PWB-9, 10, 11 & 12) have been stored for further experiments. Soil temperature tanks are being employed to assist in determining the optimum soil temperature for the seedling screen (3).

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Table 1 : Disease indices of Rhizoctonia solani on the pepper cv. 'NM6-4'when inoculated at seeding.

R. solani isolates	Disease indices*
PWB-9	8.94 A**
PWB-12	8.91 AB
PWB-10	8.86 ABC
P2S-B	8.53 ABCD
PWB-11	8.25 ABCD
Mixture of all isolates	8.14 ABCD
0-7-22	8.08 ABCD
P2R-A	7.97 BCD
V3R-2	7.94 CD
V3R-6	7.91 CD
PIR-D	7.72 D
C-7-22	7.69 D
Control (no pathogen)	0.15 E

Table 2 Disease indices of Rhizoctonia solani on the pepper cv. 'NM6-4'when inocul ated at the 4 to 6 true leaf stage.

R. solani isolates	Disease indices*	
PWB-9	3.66	A**.
PWB-10	3.49	A
PWB-11	3.12	A
PWB-12	3.05	A
P2S-B	2.12	AB
Mixture of all isolates	1.42	BC
P1R-D	1.36	BC
V3R-6	1.11	BC
C-7-22	1.03	BC
V3R-2	0.99	BC
P2R-A	0.93	BC
D-7-22	0.79	BC
Control (no pathogen)	0.22	C

* Disease indices were calculated from three replicates.
** Means with the same letter are not significantly different at 0.05 level using L.S.D. test.

Capsicum Newsletter, (1987), 73-74

RESISTANCE OF CAPSICUM SPECIES TO VERTICILLIUM DAHLIAE K.

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Verticillium dahliae has been reported on pepper (Capsicum sp.) in Europe (1), United States of America (2), and Canada (3). Attempts to control the disease using chemical (5), cultural (5), and biological (6) methods have been without positive results. As V. dahliae is persistent in the soil, breeding for disease resistance is the only effective means of control. Genetic resistance has been described in some accessions of Capsicum sp. (1,3) but not yet in C. annuum. The lack of a strong resistance to V. dahliae stimulated an extensive screening of Capsicum annuum for a source of resistance.

Three hundred and twenty-five accessions of C. annuum L., C. baccatum L., C. chacoense H., C. chinense J., C. frutescens L., and C. pubescens R. & P. (Table 1) were screened for resitance V. dahliae . Isolates of V. dahliae from California, Arizona and New Mexico were used in the screening test. The roots of 21-day-old seedlings were washed and dipped into a concentration of 1×10^6 propagules per ml for one minute (4). A minimum of 10 seedlings were transplanted to trays containing a pasteurized mixture of 1 peat moss: 1 sand: 1 loam (by volume). Trays were placed on greenhouse benches where air temperature ranged from 10 C to 300 C. Three weeks after inoculation plants were evaluated for Verticillium symptoms using a 0-9 scale where O= no symptoms, 5= chlorosis+necrotir leaf margins and 9= death. The cultivar 'NuMex R-Naky' was included as a susceptible control in each of the screening tests.

New Mexico Capsicum Accession (NMCA-298) exhibited partial resistance to Verticillium wilt. Vascular discoloration was confined to the lower portion of the plant with no V. dahlae isolated from the upper portion of the plant. Introgression of this resistance to into commercial pepper types has begun and inheritance studies to determine the kind of gene action will also be investigated.

Table 1. Accessions of Capsicum species screened for resistance to Verticillium dahliae K.

ACCESSION	RESISTANT	SUSCEPTIBLE	TOTAL
C. annuum	1	310	311
C chacoense		3	3
C. chinense		4	4
C. frutescens		2	2
C. pubescens		2	2

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Capsicum Newsletter, 6 (1987), 75-76

DEVELOPMENT OF A NEW DISEASE SCREENING TECHNIQUE FOR VERTICILLIUM WILT OF PEPPER, CAPSICUM ANNUUM

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Verticillium wilt of pepper caused by Yerticillium dahliae was first reported in the American literature Dec. 31, 1938 (Snyder, 1938). Since that time, Verticillium wilt of pepper has achieved epidemic levels in some fields of southern California (Kendrick, 1959). In New Mexico, the economic importance of this disease is on the increase (Lindsey, 1985). Therefore, a reliable and reproducible screening technique is needed to identify possible sources of genetic resistance, chemical controls and biological control agents.

Several methods of inoculation are available including stem injection, root dipping and soil inoculation. However, the stem injection and the root dipping methods are only feasible for the identification of genetic resistance. Alternatively, the soil inoculation method could be used to identify all three sources of possible protection. Unfortunately, successful soil inoculation has not been developed to the point where it is consistently reliable in peppers. Nevertheless, researchers at the Plant Protection Institute in Beltsville, Maryland have developed such a technique for the detection of potential biocontrol agents when eggplant is the host (Marois, 1982). Currently, a method for Verticillium wilt screening using soil inoculation, with peppers as the host, is being developed at New Mexico State University.

Inoculum Production. A highly virulent isolate of V. dahliae was cultured from an infected plant collected at Hatch, N.M. The pathogen is grown in pure culture on PCDA for five weeks in darkness at 250C. The cultures are then blended in distilled water (500ml/10 plates) for two minutes and the microsclerotia (MS) separated on a 200 mesh sieve. The MS are counted using an eosinophil counter, quantified in #MS/g soil (dry wt.) and mixed.

Treatments. Six treatments were evaluated; 0.0, 6.25, 12.5, 25.0, 50.0 and 100.0 MS/g soil. The pepper cultivar 'R. Nakil was grown in a randomized complete block design with three replicates. The plant trays were placed in soil temperature tanks with the soil temperature maintained at 250 C where temperature does not normally fluctuate more than 10 C.

Plant Evaluation. Each plant was scored on an interaction phenotype scale of 0 to 9 where 0 designates the healthy control and 9 designate death. The scale is described in Table 1 and the preliminary results are given in Table 2.

Infection Verification. From each treatment, a .5 cm section was taken from the upper half of the main stem of a five plant sample. Each section was soaked in a 2.5%(V:V) aqueous sodium hypochlorite solution for one minute and transferred directly to PCDA plates. The pathogen was reisolated from all treatments except the uninoculated contrcs. Experiments are in progress to investigate dosage response of pepper to higher levels.of V. dahliae than previously examined.

TABLE 1. INTERACTION PHENOTYPE SCALE

0 - no symptoms
1 - some stunting
2 - stunting and chlorosis
3 - stunting, chlorosis and discolored xylem
4 - stunting, chlorosis, discolored xylem and epinasty
5 - above symptoms plus necrosis
6 - above symptoms plus loss of lower leaves
7 - above symptoms plus loss of upper leaves
8 - above symptoms, plant near death
9 - dead plants

TABLE 2. PLANT RESPONSE

Scale	0 MS/g	6 MS/9	12/MS/g		25 MS/g	50 MS/g	100 MS/9	
	# plants		# plants		# plants	# plants	# plants	# plants
	0	101	51	24	1	1	4	
	1	0	18	61	53	55	28	
	2	0	6	0	10	25	0	
	3	0	2	9	9	4	14	
	4	0	4	0	0	0	0	
	5	0	0	11	13	20	23	
	6	0	0	0	0	0	0	
	7	0	0	1	5	4	8	
	8	0	0	0	0	0	17	
	9	0	0	0	6	9	5	

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RESISTANCE OF POWDERY MILDEW IN AN ACCESSION OF CAPSICUM FRUTESCENS AND ITS INHERITANCE PATTERN [Capsicum Newsletter,6 (.1987), 77-78]

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Resistance to poKdery, mildew (Leveillula taurica) was reported in 33 accessions belonging to six species of Capsicum other than C. annuum (Deshpande et al.,, 1985). One of the lines in Q. frutescens (IM 703Y observed. to be highly resistant to powdery mildew was successfully crossed with C. annuum cv. Arka Mohini. 1HR 703 is characterised~bymedium thick fleshed dark green fruits ripening yellow,, wrinkled, pungent, with blunt fruit apex. Using Arka Mohini (a large frufted, high yielding bell pepper variety) as a susceptible parent, F_1, F_2 and backcrosses were generated. These were evaluated during JulyOctober, 1986. The disease incidence was scored on a 1-5 scale 1 - resistant; 5 susceptible) on 3 randomly selected leaves per plant.

Incomplete dominant genes appear' to govern resistance to powdery mildew in 1HR 703 as shown by the F. score of 1.6 (Table-1). The F 2 segregation pattern did not fit into any of the known ratios indicating that at least 3 gene pairs operate for resistance to the races of the pathogen at this centre. The mean scores in the backcross generations were towards the respective parents indicating additive gene action between loci. In the BC2 generation 20.5% of the plants were resistant revealing the utility of 1HR 703 and the ease with which powdery mildew resistant selections can be developed.

Reference:

A.A. Deshpande, N. Anand, C -S - Pathak and T.S . Sridhar, 1985. New sources of powdery mildew resistance in Capsicum species. Capsicum Newsletter, No. 4 : 75-76.

Table-1. I Frequency distribution in dif f erent class'es for parents F_1, F_2 and backcrosses (in percent).

Scores generation	1	2	3	4	5	No. of plant observed	Mean score
P_1 (Arka Mohini)	-	-	-	23.1	76.9	26	4.7
P_2 (IHR 703)	100	-	-	-	-	19	1.0
F_1 (P_1 x P_2)	45.5	54.5	-	-	-	22	1.5
F_2	14.3	53.6	21.4	7.1	3.6	112	2.3
BC_1 (P1 x P2 x P1)	0	8.5	21.2	38.3	31.9	47	3.7
BC_2 (P1 x P2) x P2	20.5	30.8	25.6	17.9	5.1	39	2.0

Capsicum Newsletter, 6 (1987), 79-80

CONTROL OF SEED-RED LOSSES OF CAPSICUM

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Seed-bed los sea 1n bell pepper (Capsicum annuum L.) due to dampin off organisms viz. Pythium debaryanum, Phytophthora capsici, Rhizoctonia solai and Veticillium albo-atrum have been alarmingly increased in northern part of India. The situation has led to abandonment of fields for growing less lucrative crops. With a view few selected fungicides alone and coupled with hot water as pre and post-emergence treatments were tested for their efficacy in controlling damping off.

The fungal cultures were multiplied separately In sand maize medium for four-weeks, Steam sterilized nursery soil van Inoculated by mixing the cultures at 4 percent (W/W), 72 hours prior to sowing. The seeds of commonly grown pepper variety California Wonder were devided into two lots. Before undergoing fungicidal treatments one lot was subjected to hot water for 30 min. at 520G. After that seeds from both the lots were doaked separately for 30 min, In fungicidal suspensions alongwith sticker Tritcu - X. The Inoculated soil was drenched with respective fungicidal suspenssions at the rate of 5 lit,/m^2. of the soilq 24 hours rior to sowing. Two post-emergence sprayings at IN days Interval with respective fungicides were given after one month of soving, The experiment was conducted In 25 cm pots. The sowing was done in the second week of March and each treatment consisted 100 seeds.

The results revealed that seed treatment with hot water + Rhizolex S-3349 &nd its subsequent application as-soil drench ard sprey van superior to the rest of treatments In protecting the seeds and seedlings against damping off pathogens. Besides covplete cantrol of post-emergence damping off the Rholex treatments &-Lso produced vigorous seedlings., Comparatively less vigorous seedlings were noticed In Rovral treatments. Captan a commonly used fungicide res onded poorly. Hot vater treatment exhibited sup lementary effect to all the fungicidal treatments without affecting seedlings vigour.

Table 1. Effect of seed treatmentl'soil drenching and follar spray on the damping of f organisms

Treatment	Cone %	% of germination	Post-emergence damping off (%)	Seedling vigour* (0-10)	Average height of seedlings (cm)
Bavistin	0.15	77	9009	7.00	11.00
Bavistin + Hot water	0.15	85	5088	7.00	11.20
Captan	O.3	68	26.47	76.50	10.50
Captan + Hot water	0.3	74	25.71	6.50	10.50
Daconil-2787	0.2	75	10.66	7.50	11.20
Daconil-2787 + Hot water	O.2	80	7.50	7.50	11.20
Rovral 0.2		75	8.00	5.9	8.50
Rovral + Hot water	O.2	85	7.05	5.50	9.50
Rhiolex S-3349	0.15	80	0.00	8.50	11.50
Rhizolex S-3349 + Hot water	0.15	88	0.00	8.50	11.50
Hot water	-	37	100.00	-	-
Check (No fungicide)	-	02	100.00	-	-
Do soil inoculation	-	90	41.11	4.00	8.70

0 - Dead seedlings, 10 - Highly vigorous seedlings

Capsicum Newsletter, 6 (1987). 81-82

SPLIT APPLICATION OF NEMATICIDES TO CONTROL ROOT-KNOT-NEMATODE (Meloido-gyne incognita) AND SHOOT AND FRUIT BORER (Leucinodes orbonalis Guen) IN EGG PLANT. (Solanum melongena) SEED CROP

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Shoot and fruit borer (Leucinodes orbonalis Guen) damages more than 70 per cent of this crop in India (Lal, B.S. 1964, Vegetable Pests Entomology in India, p.187). At the Vegetable Farm of Punjab Agricultural University, there is 40 to 50 per cent loss in eggplant crop due to root-knot nematode and a complete Failure of this crop ocours during rainy season, due t.o severe atteck of shoot and fruit borer.

Green leaves of neem (Azedirachte indica) or Persian lilat (Melia azadarch*) 'were mixed with so'17-1 -at the rate. of 500 g/m.2, one week before transplanting of five week old seedlings, while nematicides Carbofuran (3 G) and Aldicarb (10 G) were mixed at the rate of 1, 2, 3 kg a.i. ha-1 into the soil or applied intb the pits. The split application (Table 1) of nematicides were given at the interval of 30 days. The experiment was carried out in triplicate in 4 m x 4 m plots with plants at 70 cm x 40 cm spacing. Weekly pickings were done and yield of fruits in.kg per hectare was worked out. Root-knot index (R.N.I.) was also determined at harvest.

The results indicate (Table 1) that in the' absence of borer attack application of leaves of neem or persian lilacsuppress the population of nematodes and increase the yield of brinjal fruits (Table 1) indicating that these act both as nematicides and fertilizers. Fruits, after treatment of soil with such leaves do not have any nematicide residue as is the, case with nematicides. Therefore, vegetable crop can be used for table purpose. In the field heavily infested with root-knot nematodes, Carbofuran or Aldicarb used at the rate of 1 kg a.i.ha-1 were not effective. Higher-doses and split application of these nematicides were effective but may pose problems as nematicide residue, if the eggplant Fruits are used for table purposes. It was further observed that severe attack of shoot and fruit borer on the eggplant crop can be prevented by above treatment or nematicides (Table 1) by takingseed crop instead of vegetable crop for table purposes. Split application of nematicides was more effective then application of their single dose.

Table 1.Efficacy of leaves of neem (Azadiracha.indica), persian lilac (Melia azadarch) and.-nematicides on the yield and control of root-knot nematode (Meloidogyne incognita) infestation and shoot and fruit borer (Leucinodes orbonalis Guen) attack on egg plant (Solanum melongena).

Spring Crop (Root-knot infestation only)				Rainy season Crop (Root-knot nematodes + shoot and fruit borer attack)		
Treatment	Yield.(Times increase over control)		R.N.I.	Treatment	Yield (Times) increase over control.	Condition of Crop & R.N.K.
Neem leaves, 500g/m 2			5.1	1.5	a)Broadcasting Leaves of neem/persian lilac (500g/m2)	No flowering or fruit formation	Stunted growth
Persian lilac leaves 500g/m2			4.9	2.0			
					Carbofuran lkg a.i./ha	-do-	Wilting(dead)
CD Nematicides					Carboruran 2kg a.i./ha		Stunted growth
a) Broad casting (pit application^{-1})					b)Split application		
Carbofuran(kg.A,.i.ha-					Persian lilac + carbofuran		
3		3.3 (3.6)		5.0 (5.0)	(50og/m2+lkg a.i./ha $^{-1}$)	3.1	4.0
2		3.1 (3.3)		5.0 (5.0)			
1		1.0 (1.3)		6.0 (6.0)			
Aldicarb(kg.a.i.ha -1)					Carbofuran(kg a.i.ha^{-1})		
3	3.5	(3.6)	5.0	(5.0)	1 + 1	2.8	5.0
2	3.3	(3.6)	5.0	(5.0)	2 + 1	4.2	5.0
1	1.4	(1.6)	6.0	(5.0)	1 + 1 + 1	6.2	3.0
b) Split application (kg.a.i.ha			Control				
Carbofuran	1+1		4.1	5.0	(O+Carbofuran 1 kq-1)	1.0	6.0
Aldicarb	1+1	4.4	4.0	a.i.ha			
Control		1.0	6.0				

R.N.I. : (1 = no infestation; 2 1-25%; 3 = 26-50%; 451-75%; 5 = 76-100% infection and 6 = confluent galling).

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YIELD LOSSES DUE TO VARIOUS PESTS IN HOT PEPPER

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Occurrence of white mite Polyp, hagotarsonemus latus and thrips Scirtothrips dorsalis H, from the early growth of chilli crop and the fruit borer Spodoptera Litura F.. from the reproductive phase leads to severe losses in hot pepper. At the Regional Agricultural Research Station, Lam, Giinturf experiments were carried out during 1985 to 187 for assessing the yield losses due, to various pests for formulating effective and economic pest control measures for the important chilli pests.

The average yield losses during two seasons along with the mean incidence are furnished in the table. As seen from the data, all the major Insect pests put together were capable of reducing the yield as high as 76.68 per cent. Sucking pests equally damage as that of fruit borers. The thrips as well as mites caused equal yield losses to the extent of 20.50 per cent to 24.89 per cent respectively. Interspecles competition was more pronounced between mites and thrips. Their combined incidence accounts for any yield loss of 34.14 per cent. Thus it could be concluded that taking appropriate plant protection against mites and thrips with selective insecticides apart from controlling fruit borers, which apparently damage the crop causing considerable yield losses, could easily salvage 50 per cent loss in chilli yields.

Table : Felt losses in chillies due to key pests

S.No.	Insect	Mean incidence in yield M	Mean reduction
1.	White mite	94.70 nos/50 leaves	24.89
2.	Thrips	31.03 nos/50 leaves	20.50
3.	Pod borer	22.37 %	35.93
4.	All sucking pests	--	34.14
5.	Sucking pests & borers	--	76.78

EFFECT OF PARTIAL VACUUM ON VIABILITY OF SWEET PEPPER SEEDS

Capsicum Newsletter, 6 (1987), 85-86

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Bell pepper (Capsioum annuum.L.) seeds are short lived and high storage temperature, moisture or relative humidity further reduce the longevity. However~ in certain vegetable seeds the oxygen also play a vital role in deterioration. Storae.e of seeds either in vacuum or with inert Cases increase the viability (Bass and Stanwood, 1978). The present experiment was conducted to study the effect of'partial vacuum on the seed viability during ambient storage.

Materials and Methods

Seeds of sweet pepper ov Arka Kohini hav ine 7.0 per cent moisture were packed in laminates under partial vacuum and paper envelops as check and stored. in ambient conditions(16-35C, RE 25-90%)- Seed viability and seedling vigour were assessed periodically. Seeds were germinated at 30 C in seed germinator and seedlings were evaluated as per-the standard ISTA procedure(Anon. 1985)- Shoot length and dry weight were recorded on eight days old seedling.

Results and Discussion

Therewas significant impact of partial vacuum on the germination of seeds (Table 1). Seed viability was high in vacuum stored seeds than check after 18 months of storage. None of seeds were viable after 30 months of storaGe. There was no difference in seedling vigour in terms of shoot lenEfth and dry weight in vacuum stored seeds and check. The study revealed that storage of seeds in partial vacuum preserves the seed viability under ambient conditions sugr.esting thereby involvement of oxygen in seed deterioration. High percentage of germ.ination in vacuum stored seeds was -probably due to decline in o-.%*-gen level and increase in carbon-di-oxide in laminates.

References

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Bassq L.N. and Stan-woodq P.C. 1978. Long term preservation of sorghum seeds as affected by seed moisturej temperature chd atmospheric environment. Crqp Sci., 18:575-577.

Table 1: Influence of partial vacuum on seed viability and seedling vigour during storage

Storage period (months)	Seed viability: Germination(~.) Vacuum	Germination(~.) Check	Seedling vigour: Shoot length(cm) Vacuum	Shoot length(cm) Check	Dry weight(mg) Vacuum	Dry weight(mg) Check
0	85	85	1.1	1.1	3.0	3.0
6	79	67	1.7	1.9	3.9	3.9
18	59	41	1.8	1.6	4.9	3.9
30	0	0	0.0	0.0	0.0	0.0
L S D	8.1		0.41		0.43	

GERMPLASM RESOURCES OF SOLANUM MELONGENA FROM SPAIN.

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A project for collecting vegetable crops in Spain was started in 1984. The project was supported by the IBPGR/FAO. The first accessions collected of Solanum melongena were published previously (Cuartero et al.,1985). Later,we collected 42 new accessions from Valencia, Catalun'a, Murcia and Andalucia areas. Table I shows the origin and some characteristics of the accessions collected.

Table I Accesions collected. [capsicum Newsletter? 6 (1987),87-881

Identification	Locality	Local Name	Observations
A-S-1	Teruel	Bereniena	For boiling
AN-S-19	Alcala la Real	Berenjena	For stewing and boiling
AN-S-20	Martas	Berenjena rabo corto	For stewing and frying, short peduncle.
AN-S-21	Marmolejo	Berenjena rabo largo	For stewing and frying, long peduncle.
AN-S-22	Mengibar	Berenjena rabo largo	For stewing and frying, long peduncle.
AN-S-23	Canena	Bereniena rabo largo	For stewing and frying, long peduncle.
AN-S-24	Canena	Bereniena	For stewing and frying.
AN-S-25	Santa Fe	Berenjena redonda y morada.	For frying and roasting round and violet colour
AN-S-26	Santa Fe	Berenjena redonda y negra.	For frying and roasting round and black colour.
AN-S-27	La Carlota	Bereniena de cocido.	For stewing.
AN-S-28	Jauja	Berenjena rabo largo	For stewing and frying, long peduncle.
AN-S-29	Jauja	Blanca.	For stewing and frying, white colour.
AN-S-30	Jauja	Rayada	For stewing and frying, ruled fruit.
AN-S-31	Puentegenil	Berenjena	For stewing. de cocido.
AN-S-32	Puentegenil	Berenjena gorda.	For stewing and frying, big size.
AN-S-33	Gibraleon	Bereniena	Bulb shape. de bombilla.
C-S-7	Vilabertran	Berenjena	Ruled fruit. rayada.
C-S-B	Cataluna	Bereniena larga.	Long fruit.
C-S-9	Cataluga	Bereniena	Long and black fruit. larga negra.

Identification	Locality	Local Name	Observations
C-S-10	CataluAa	Berenjena	Round fruit. redonda.
CA-S-1	San Nicolas	Berenjena	Medium size,oval shape.
MU-S-1	El Mirador	Larga morada semitemprana	Long and violet fruit, early crop.
MU-S-2	Torre Pacheco	Redonda morada.	Violet colour.
MU-S-3	Monteagudo	Listado de Gandia.	Ruled fruit.
MU-S-4	Villa del Azarbe	Alargada	Long and violet colour. violeta.
MU-S-5	Zeneta	Larga listada de Gandia.	Long and ruled.
MU-S-6	Patino	Redonda morada lisa.	Violet colour.
MU-S-7	Beniajan	Larga negra.	Long and black.
MU-S-8	Media le gua	Redonda negra	Round and black.
MU-S-9	Las Torres de Cotillas	Violeta larga	Long and violet colour.
MU-S-10	Alhama morada.	Redonda	Round and violet colour.
MU-S-11	Totana	Redonda negra	Round and black colour.
MU-S-12	Lorca	Larga negra	Long and black colour.
V-S-11Dolores	Listada de Gandia.	Ruled fruit.	
V-S-12	Benijofar	Larga negra	Long and black CDlour.
V-S-13	San Fulgencio morada.	Redonda	Round and violet colour.
V-S-14	Rafal	Larga negra.	Long and black colour.
V-S-15	Aspe	Listada de Gandia.	Ruled fruit.
V-S-16	Noveld	Redonda negra	Round and black colour.
V-S-17	Elche	Larga violeta negra.	Long and violet-black colour.
V-S-18	Elda	Larga negra.	Long and black colour.
V-S-19	Muchamiel	Larga morada.	Long and violet colour.

References:
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Acknowledgements: We are extremely grateful to the Diputaci6n de Valencia, Servicio de Extensi6n Agraria and to all those who have collected vegetable crop germplasm: M.S. CatalA, M.L. G6mez-Guillam6n, C.Cortes, G.Anastasio and P. Fern6ndez de Cordova.

Capsicum Newsletter, 6 (1987), 89-90

PRODUCTION OF ANTHER-DERIVED PLANTLETS OF EGGPLANT

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In vitro anther response of four cvs and six hybrids of eggplant on eight induction media was investigated. Flower buds containing uninucleated microspores were collected, during spring and summer time, from plants grown in the field.

Anther culture war carried out following the method proposed by Dumas de Vaulx et al (1982) modified as for IAA, NAA, zeatin and glucose concentration. Out of 9.050 cultured anthers, 531 well-formed androgenetic embryos were obtained.

Anther responses were clear cut influenced by the genotype: the best performence was given by 1L.V. Barbentanel while the other cvs on average yielded less than the hybrids (tab. 2). Besides, the F 1 hybrid 'Ronde de Valence x Dourgal gave no embryos in contrast with the result obtained by Chambonnet (1985).

Also the hormon content in the medium had a strong influence on the androgenetic process (tab. 3) of the different genotypes. For istance, NAA and zeatin was capable to improve the percentage of embryos in the cv 'L.V. Barbentanel and in the hybrid IWIR768 x Viserbal (Rotino et al., 1987). As far as the efficacy of sucrose and glucose is concerned, the highest concentrations seems to be the best, however further investigation is needed.

These previous data suggest that a precise choice and a suitable balance of auxins and cytokinins can obtain an enhancement of in vitro anther response in eggplant genotypes.

Data regarding the ploidy level of anther-derived plants from these experiments are not yet available, however from a previous similar experiment the percentage of haploid and diploid resulted to be 65% and 35% respectively (Rotino et al., 1987).

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CHAMBONNET D., 1985, Culture d'antha!res in vitro chez trois Solanacees maraicheres: le piment (Capsicum annuum L.), l1aubergine (Solanum melongena L.), la tomate (Lycopersicon esculentum
Mill.) et obtention de plantes haploides. These de Docteur d'Universit&. Academie de Montpellier. ROTINO G.L. et al., 1987, Possibility of eggplant' (Solanum melongena L.) improvement through in vitro techniques. Genet. Agr., 41, p. 267.

Table 1: Kindand concentration of compounds added to Dumas do Yquix bagel medium.

Compounds	Induction media-							
	1	2	3	4	5	6	7	3
Sucrose(gr/1)	120	30	60	60	60	60	60	24
Glucose(gr/1)	-	-	63	63	63	63	63	6
Kin (mg/2)	3	0,01	5	5	5	-	-	0,01
2,4 D (mg/1)	-	0,01	-	-	5	-	3	0,01
IA6 (mg/1)	1	-	5	-	-	-	-	-
HAA (mg/1)	-	-	-	5	-	3	-	-
Zoatin (mg/1)	-	-	-	-	-	1	1	-

Table 2. - Norber of cultured anthers, number and percentage of embryos - and number of plentlets. At the present transpented In the sell, for each genotype not considering the media tested.

Genotype	No of cultured anthers	Embryos no	%	No of plentlets
Dourge	900	6	0.60	6
Floralba	400	1	0.25	1
Ronde do Valence	750	1	0.13	1
Lunge Polette Borbentone	910	306	33.63	193
L.Y.Darbontono x Floralbo	1000	17	1.70	15
Ronde do Valelice x Dourge	700	-	-	-
Dourge x Ronde de Valence	1460	53	3.97	43
Picentle x Long Purple	750	33	5.00	32
Will 763 x Viser6a	910	95	10-44	50
WIR 763 x Picentia	970	9	0.93	3
Total	9050	531	3.37	349

Table 3 Number of cultured anthers and percentage of embryos obtained from L. V. Barbantans, Dourga x Ronde de Valence, WIR 763 x Viserba, WIR 763 x Picentia, for each media tested.

Media	Lunge violet to Barbentane		Dourga x Ronde de Valence		WIR 763 x Viserba		WIR 763 x Picentia		Total	
	anth. n	embr. %	anth. no	embr. %	Anth. no	embr. %	Anth. no	embr. %	Anth no	embr. %
1	18O	3.9	100	3.0	130	-	-	-	430	2.3
2	60	-	200	2.5	-	-	120	-	330	1.3
3	60	5.0	170	0.5	110	2.7	200	-	540	1.3
4	160	120.0	-	-	130	23.7	-	-	290	76.5
5	260	13.0	13.0	5.0	-	-	120	7.5	560	11.6
6	50	32.0	490	7.5	170	14.0	230	-	930	3.2
7	30	136.0	330	1.2	170	1.2	300	-	336	5.7
8	110	-	-	-	200	13.0	-	-	310	11.6

Capsicum NewslC-ttier, 6 (1987), 91-92

MANIPULATION OF PHOTOSYNTHETIC StRFAC3 AND SINK IN EGG PIaRT

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The continuing pressure to produce high yielding oultivars has stimul ted interest in physiological factors contributing to final yield and in possibilities for using such factors in selection (Srinivasa Rao, 1984). The effect of varying leaf area on yield components of two cultivars of Eggplant 'Pusa Purple long' and'Arka Navneetvas studied, for understanding the souroe-sink relationships. Because of simultaneous vegetative and reproductive growth, competition. for assimilates are expected to occur amongst growing points. The treatments included (a) removal of all leaves (11), (b) 75% of the number of leaves in control retained (T2)9 (o) 50% of the number of leaves removed (T 3)9 (d) 75% of the number of leaves on main stem removed (T 4) and (e) side shoots defoliated (T 5). The treatments were given at the time of emergence of first inflorescence. The economic yield decreased in both the genotypes, it the assimilating area was expertmentally reduced. The decrease in leaf area did not affect the sink potential; either the number of inflorescence per plant or the number of potential fruits per plant. However the number of fruits per plant decreased with loss in leaf area suggesting that the plants regulated this yield component to suit the size of the source. The dry matter accumulation was more or less same in all the treatments (Table I).

Srinivasa Raoq N.K. 1984. Physiological Analysis of growth in brinJal (Solanum melongena L). Garbenbauwiseenshaft. 49: 64-67.

Table 1. The effects of reduction in leaf area on sink potential and economic yield in Brinjal

Genotypes	Treatments	Economic yield (g)	No. of inflore-scence/ Plant	Potential no. of fruits/plant		Actual no. of fruit/ Plants	Drymatter accumu-lated (g)/fruit	Fresh wt. Per fruit
				In all inflore-scence	In fruit bearing inflore-scens			
P.P.L	T_1	981	7.7	33.5	24.9	20.8	4.4	50.4
	T_2	767	7.3	34.7	25.3	16.2	4.2	45.5
	T_3	698	7.2	30.9	23.4	14.0	4.3	41.5
	T_4	684	7.1	28.8	21.2	13.1	4.5	39.8
	T_5	748	7.3	31.6	24.6	16.2	4.5	40.8
A. Navneet	T_1	1157	6.8	24.9	15.9	8.8	14.2	165.4
	T_2	916	6.5	21.0	14.3	7.9	13.7	.136.1
	T_3	830	6.4	20.9	13.0	6.8	13.9	133.1
	T_4	790	6.1	19.0	11.7	6.5	14.0	127.7
	T_5	871	6.3	21.3	13.8	7.7	14.1	140.9
CD varieties	5%	58	0.2	1.4	0.5	0.5	0.2	1.3
	1%	106	0.4	2.6	1.0	0.9	0.4	2.3
Treatments	5%	28	0.2	0.9	0.9	0.5	0.2	2.7
	1%	38	0.3	1.2	1.3	0.7	0.3	3.6
V x T	5%	39	NS	1.2	NS	0.7	NS	3.8
	1%	54	NS	1.2	NS	1.0	NS	5.1

THE PRELIMINARY STUDIES ON VIRUS DISEASES OF EGGPLANT IN TURKEY

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Eggplant **(Solanum melongene L.)** is one of the main vegetable crops in Turkey. It is cultivated in both the field and glass-or plastic houses throughout the entire year.

In the course of the survey in the growing seasons - 1984 and 1985 over especially Southern and Western parts of Turkey it was observed that many eggplants showed virus-like symptoms as stunting, deformation and spotting on leaves, and reduction in size of leaves. We, therefore, tried to identify the virus (es) involved in the present study.

After the mechanical inoculation of leaf samples collected, according to their symptoms an the test plants the virus isolates from eggplants could be divided in two distinctive groups.

The majority of isolates obtained was in Group 1 and they produced the same symptoms on certain test plants **(Antirrhinum majus, Capsicum annuum, Chenopodium amaranticolor, C. quinoa,~ Datura stramonlum, Gomphrena glabosa, Lycopersicon esculentum, Nicandra physalaideB, Nicatiana glutinosa, N.rustica and N.tabacum** "cvs. Maden and Xanthill) as those recorded for tobacco mosaic virus (TM) in literature. Moreover, these isolates were succ essfully purified with earlier methods applied for TMV and the clear precipitation lines were observed when these isolates were tested with antisera to isolates of TMV isolated from tobacco and tomato plants in our previous works. The electron microscopical examinations revealed that the isolates in Group 1 had rod-shaped particles, closely resembling those of common TMV.

The isolates in Group 2 infected systemically N. glutinosa test plant in. particular and caused the pronounced mosaic on younger leaves of this plant. For detecting the virus it is continued the studies as to the purification and the observations in the electron microscope.

Capsicum Newsletter, 6 (1987), 94-95

IN VITRO SELECTION OF EGGPLANT CELLS RESISTANT TO CULTURE FILTRATE, OF VERTICILLIUM DAHLIAE KLEB. AND REGENERATION OF PLANTS.

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Tissue culture. Morphogenetic callus was obtained from leaf disks of the cv 'Lunga Violetta PDF1 following the method described by Gleddie (1983). Embriogenic cell suspension was induced and mantained on NS basal medium supplemented with 2 mg/l of 2,4D. For embryos induction, cell Suspension was transferred into MS basal medium with 500 mg/l of serine. Plant regeneration was also obtained by plating cells on agar solidified embriogenic medium. The environmental conditions of cultures were: 16 h day length under 1500 lux (gro-lux lamps) and 25 $+1^0$C day and night temperature. For suspension cell culture, 250 ml Erlenmeyer flasks containing 50 ml liquid medium were kept on gyratory shaker at 120 r.p.m.

Fungus culture. Two isolates of V. dahliae (V.161 and V.206) supplied by Institute of Plant Pathology of B , were grown at 250C in Czapek Dox. Broth liquid-state culture. From 7 to 30 day of culture, every three days, samples of liquid medium were drawn and filtered (0,45 m pore). Culture filtrate toxicity test was carried out by soaking germinating seeds of eggplant 'Maya F 1 1 and tomato 1S.Marzanol into each sample of the filtrate; after 4 days the length of roots was recorded (Fig. 1 and 2).

V. dahliae culture filtrate displayed its highest toxicity on the 22 nA- day in Czapek liquid medium.

Selection. Cell lines were exposed for 10 days to the liquid medium containing 40% of culture filtrate of the two isolates. Surviving cells were subcultured in not toxic liquid medium, exposed again to the filtrate in liquid or solid medium and then transfered in embriogenic medium for regeneration (fig. 3) From cells resistant to crude culture filtrate, 23 somaclones (R 0) were successfully established in soil and set seeds. The resistance test to the fungus are now in progress, on R 1 and R 2 progenies of these clones, by applying both artificial infection and by measuring the ion leakage. To this porpose 1 or 4 eggplant leaf disks were dipped into 1%, 5% and 10% diluite filtrate of the fungus. The most suitable combination was 4 leaf disks into 5% diluite filtrate (fig. 4)

GLEDDIE S. et al., 1983, Somatic embryogenesis i and plant regeneration from leaf explants and cell suspension of Solanum melongena (eggplant), Can.J. of Bot., 61, p.656.

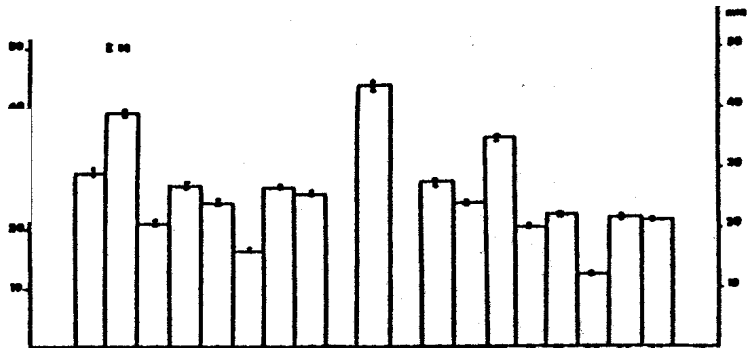

Fig 1 – Root length (mm) of eggplant 'Maya F1' seeds exposed to the V. dahliae isolates V.161 and V.206; samples of 50% dilute filtrate of the fungus were drawn fro 7th to 30th day of culture V.161, LSD (p. 0.50) 4.39 mm; V.206, VSD (p 0.05) 4.63 mm.

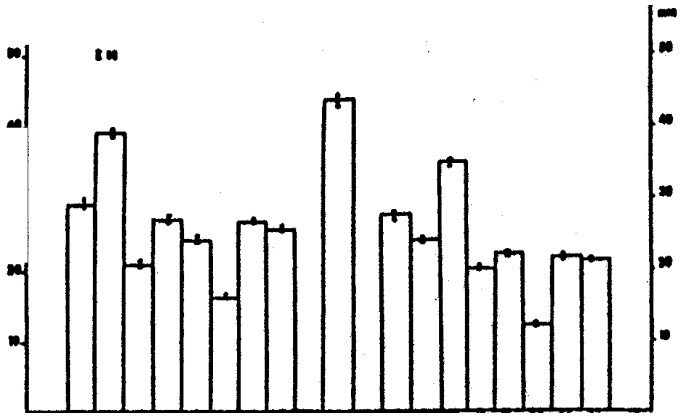

Fig 2 – Root length (mm) of toato 'S.Marzono' seeds exposed to the V.Dahliae isolates V.161 and V.206; samples of 50% dilute filtrate. V.161, LSD (p 0.05) 5.56 mm; V.206, LSD (p 0.05) 4.82 mm.
V.dah liae I isolates V.161 and V.206; samples of 50% diluite f t
fungus were drawn from 71~tr:ts0o~ they of culture V.161, LSD (p 0.05)*4.39sm; V.206, LSD (p 0.05).4.63am.

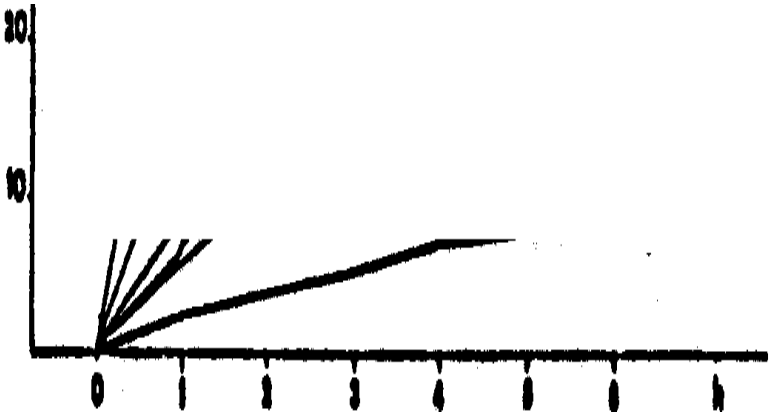

Fig. 4 Trend I of electrical conducibility S cm) of I or 4 leaf disks of eggplant dipped Into 1%, 5% and 10% diluited culture filtrate and Into distilled water.

Fig. 3 - Selection scheme of e-mpiant for resistance to V. dahlias

Egwlont coil suspension into medium containing 40% of V. dahlias culture filtrate → Moltiplication of surviving cells into unselective liquid medium → Maintenance of callus on solid medium contai-ning 50% of V. daliae culture filtrate

Capsicum Newsletter, 6 (1987), 96-97

CHANGES IN THE COMPOSITION OF CELL WALLS OF ROOTS OF EGG PLANT (' Solanum melongena) VARIETIES, AFTER INFESTATION WITH ROOTKNOT NEMATODE (Meloidogyne incognita)

S. Ahuja, M.C.Mukhopadhyaya*, B.K.Gupta and S.P.Ahuja
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Burdwan University, Burdwan-713 104, India

Although the reports of enzymatic changes in nematode infested roots are available (Das Gupta, D.R. and Ganguli,A.K. 1986, In: Plant Parasitic Nematodes,of India, p.458, eds. G.Swarup an~F D.R.Dasgupta, IARI, New Delhi), yet little is known about the changes in composition of cell wall and cell solubles after root-knot nematode i-nfestation (Rajan, Varaprasad, K.S. and Swarup,G., Vistas in Plant Pathology,1986, p.221-236).

In the present study, one-month-old seedlings of different varieties of eggplant (Table 1), grown in sterilized soil, were transplanted singly in sterilized soil in 25 cm pots. Fifteen days after transplantation, 1000-second stage larvae, obtained from roots of infested eggplants, were inoculated around the root zone of a seedling. The inoculated and the control plants were uprooted after three months. The washed galls and normal roots were dried at 600C and analysed for cell wall constituents (Goering, H.K. and Van Soest, P.J.,1970, USDA Hand Book No.379, Washington,D.C.).

The resistantt wild variety had lowest amount of crude protein, cell solubles and lignin and higher amounts of neutral detergent fibre (NDF), acid detergent fibre (ADF) and cellulose as compared to the varieties with variable susceptibility to root-knot nematode. The crude protein contents, NDF, ADF, hemicellulose,cellulose were increased in all the susceptible varieties after infestation with root-knot nematode but the lignin and cell soluble content were decreased. The less susceptible variety Annamalai did not show much change in lignin content after infestation with root-knot nematode (Table 1). The decrease in the lignin content after rootknot nematode infestation may be due to decreased activity of peroxidase which is required during the initial steps of its biosynthesis (Salisbury, F.B. and Ross,C.W. 1978, Plant Physiology, p.217-242 Wadsworth Pub.Co.Inc.,Belmont,USA). The increase in cellulose, hemicellulose, ADF, NDF and proteins and decrease in cell solubles after root-knot nematode infestation (Table 1) indicate giant cell formation and conversion of cell solubles into cell wall constituents.

Table 1. Changes in the compositin of cell wall of rots of egg plant (Solanum melongena) varieties after infestation with root-knot nematode (Meloidogyne incognita)

Variety	Crude protein	NDF	Cell Solubles	ADF	Hemicullulose	Cellulose	Lignin	Silica
Resistant wild variety								
S sisymbrifolium	7.95	61.5	39.	48.2	12.3	36.7	10.3	1.2
Highly susceptible wild variety								
S tarbum	10.54 (15.54)	58.7 (61.2)	41.3 (38.8)	46.7 (47.6)	12.0 (13.6)	31.8 (35.5)	15.2 (10.8)	0.6 (1.3)
Tolerant Varieties								
Chandigarh Sel	12.02 (13.40)	51.3 (60.0)	48.7 (40.0)	42.6 (45.0)	8.7 (15.0)	25.9 (32.0)	15.7 (12.0)	1.0 (1.0)
P8	10.17 (11.10)	56.3 (59.6)	43.7 (40.4)	42.8 (44.8)	13.5 (29.2)	26.0 (29.2)	14.8 (13.8)	2.0 (1.8)
Highly susceptible varieties								
Punjab Chamila	10.54 (15.17)	56.1 (61.0)	43.9 (39.0)	41.0 (42.6)	15.1 (18.4)	26.0 (29.9)	13.9 (10.9)	1.1 (1.8)
S16	14.61 (17.02)	54.7 (57.1)	45.3 (42.9)	48.6 (48.6)	6.1 (8.5)	35.9 (36.6)	11.2 (10.0)	1.5 (2.0)
Less susceptible variety								
Annamalai	11.10 (15.17)	58.6 (63.4)	41.4 (36.6)	43.5 (46.4)	15.1 (17.0)	28.9 (31.0)	14.3 (13.9)	0.3 (1.5

Figures in parenthesis represent values of inoculated and infested plants.

[Capsicum Newsletter, 6 (1987), 98-99]

EFFECTS OF INFESTATION OF EGG PLANT (Solanum melongena) WITH ROOT KNOT NEMATODE (Meloidogyne incognita) ON THE OXIDATIVE ENZYMES AND CELL WALL CONSTITUENTS OF THEIR HOOTS

S.Ahuja, M.C.Mukhopadhyaya, Ajaib Singh and S.P.Ahuja

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*Burdwan University, Burdwan-713 104, India

The nematode infestations increase the levels of some enzymes (Ahuja, S.. & Ahuja,S.P.,1980,.Nematol. Medit. 8, p.207; and Ahuja, S., Kapur, P., Mohan, R. & Ahuja,S.P.,1983,Capsicum News, 2, p.149) and chemical constituents (Dropkin,V.H., 1972; OEPP/ EPPO Bulletin 6, p.23). However, little is known about the chemical and enzymatic changes during development of the roots of the egg plant after infestation with the root-knot nematode (Gomme-rs, F.J-., 1981, Helm'inthol.Abst. 50, p.9).

In the present study one-month-old eggplant seedlings var. Pusa Purple Long, grown in sterilized soil, were transplanted singly in sterilized soil, in 25 cm pots. Fifteen days after transplantation, 1000-second stage larvae, obtained from roots of infested eggplants, were inoculated around the root zone of a seedling. The inoculated and the control plants were uprooted on day 7, 14, 21, 28 and 50 post-inoculation. The washed galled and normal roots were analysed for soluble sugars and proteins, peroxidase (PO) and polyphenol oxidase (PPO) activities..From the dried samples, the cell wall constituents were also determined.

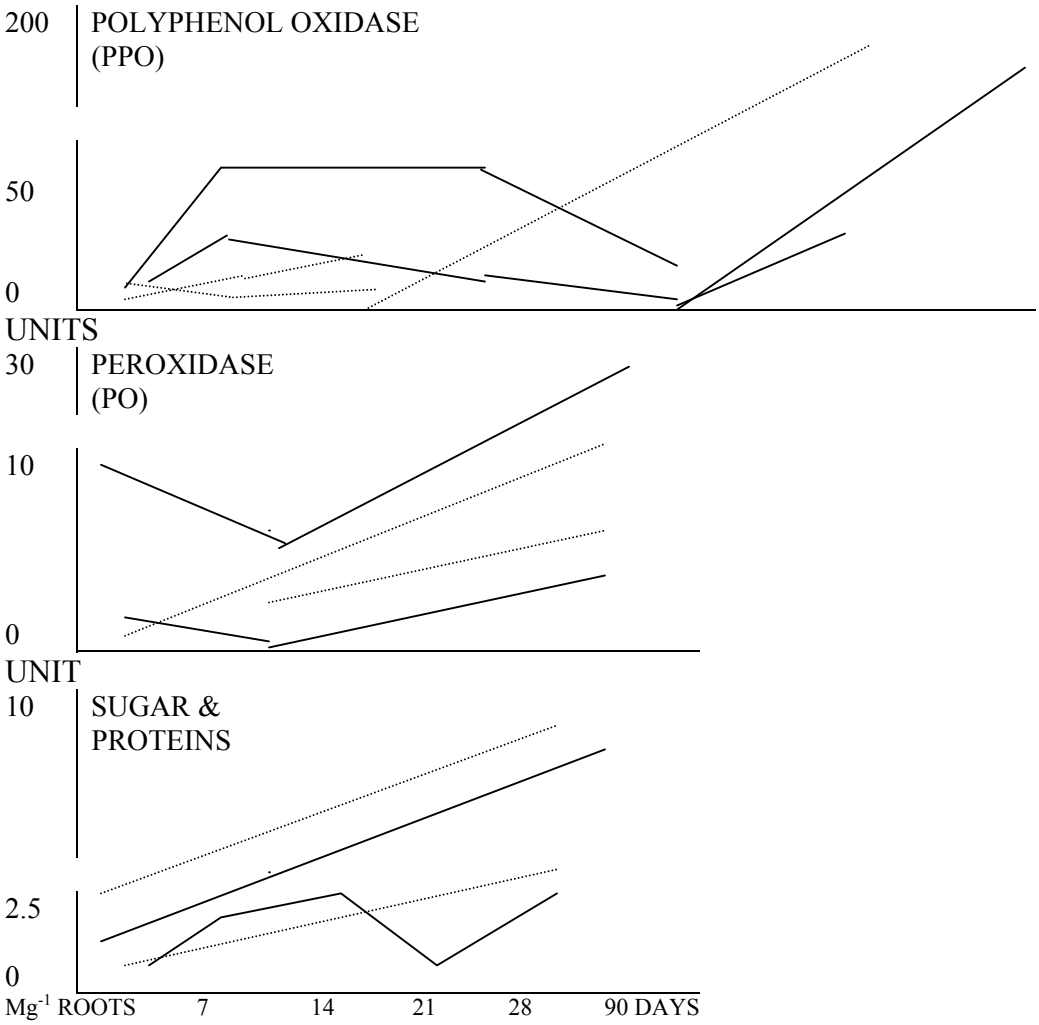
On weight basis the infested roots had higher contents of cell solubles, hemicellulose, cellulose, ash, soluble proteins, PO, PPO and had lower contents of soluble sugars and lign-in (Table I, & Fig.I). Throughout the growth period of roots the activity of PO was much higher than that of the ' PPO. However, on per mg protein bases, the nematode infestation respectively increased and decreased the activities of PPO and PO, during the first 21-28 days post-infestation. The PO and PPO activities then increased upto 90 days (Fig.I). It is known that higher levels of PO and IAA, respectively increase the 'formation of lignin and giant cells (Giebel,J.,1974,Biochem. Mechanisms of Plant Resistance to nematodes -a review. J.Nematology, 6, p.175). Most of the workers have given activities of PO and PPO on tissue weight basis rather than per unit protein basis; the latter is more accurate. The lower levels of lignin and PO (per mg protein basis) observed during this study indicate that nematode infestation of roots of eggplant prevent the lignification during the first four weeks after infestation and to a lesser extent later on. Increased levels of PPO (Fig.I) indicate reversal of inhibition of the PO by polyphenols, which are increased after nematode infestation of eggplants roots.

Fig 1. CHANGES IN THE LEVELS (ms-1 PROTEIN X AND s-1 ROOTS) OF PPO, PO, SUGARS (X) AND PROTEINS (.) IN CONTROL (---) AND NEMATODES INFESTED (—) EGG PLANT ROOTS

TABLE 1. CHANGES IN THE LEVELS OF CELL WALL CONSTITUTENTS OF EGG PLANT ROOTS AFTER NEMATODES INFESTATION

COMPONENTS	CONTROL	INFESTED
DRY MATTER	10.0	9.6
CELL SOLUBLE	49.8	53.7
NDF	50.2	46.3
ADF	36.5	29.5
HEMICELLULOSE	13.7	16.8
CELLULOSE	15.8	16.7
LIGNIN	19.3	12.5
TOTAL ASH	2.9	3.8
SOLULE ASH	2.4	3.5
SILICA	0.5	0.3

ADF = ACID DETERGENT FIBRE
NDF = NEUTRAL DETERGET FIBRE



EGGPLANT SEED VIABILITY ESTIMATED THROUGH THE TETRAZOLIUM TEST

A.Rota, C. Jacquemod and L. Quagliotti [Capsicum Newsletter,6 (1987),l00-l01]
Institute of Plant Breeding and Seed Production - The University of Turin -Italy

The tetrazolium test (TTC) was employed on eggplant to evaluate the viability of those fresh, normally imbibed, but ungerminated seeds (FUS) that can be found at the end of a germination test, especially if the environmental conditions are not favourable to the germination process. The employed technique is described in a previous paper (QUAGLIOTTI, ROTA, 1987). The present work has been planned to verify if the results of a germination test are comparable to those of a biochemical test. Besides, it tries to ascertain whether "dubious cases", that is those seeds of difficult evaluation, having for example unstained endosperm or endosperm with dark areas due to fungal infections, are to be scored as viable or nonviable.

Materials and methods
Samples of seeds belonging to the cultivar 'Long Violet' CLV) and to the F1 hybrid 'Black Bell' CBB') were used. Two environmental conditions were chosen: the "standard" one, provided -for by the official methos (ISTA, 1985) (alternating temperature regime of 20/300C, 8 hours of lighting in coincidence with the higher temperature) and a second one, with the uniform temperature of 350C and the absence of lighting.

Firstly, the biochemical test was carried out on 3 replicates of 100 seeds of 'LV' and 3 of 'BB'; 3 more replicates of 100 seeds each for each cultivar were put to germinate under the two differing environmental conditions - inside Petri dishes, on a double moistened filter paper layer- for 55 days. At the same time, 12 more Petri dishes containing 100 seeds each, for each cultivar, were placed into the germination chamber set at 350C of temperature. After 14 days, 6 of the aforesaid Petri dishes 0 of 'LV' and 3 of 'BB') were transferred at 20/300C, while the tetrazolium test was carried out on the FUS remaining in other 3 Petri dishes respectively. After 45 days, the remaining 6 replicates for each cultivar were subjected to the same procedure (3 transferred and 3 tested with tetrazolium). Ten more days later, the experiment ended. The number of germinated seeds was registered daily.

Results and discussion
Seeds belonging to 'LV' resulted better than those belonging to 'BB', showing indeed a germinability (PG) of 99% in the "standard" environment, after 14 days, against the 78% of the -hybrid. Besides, high temperature showed a more negative influence on 'BB' than on 'LV' (Tab. 1).

From the comparison between the PG in the "standard" environment and the results of the tetrazolium test initially done on 300 seeds, it appears that the TTC tends to give values statistically higher than those of a germination test (especially if "dubious cases" are considered alive) (Tab. 2). On the contrary, when FUS are added to PG, TTC and germination test values do not differ statistically anymore: FUS are then viable seeds, singled out by the biochemical test, but unable to germinate.

The transfer of the seeds from 350C to more favourable conditions (20/3000 produces a PG increase (AN . The final PG values obtained transferring 300 seeds (for each cultivar) at 20/300C after 14 and 45 days of stay at 350C were 100
compared to the PG values added to the number of alive seeds resulting from a TTC. In Tab. 3 data concerning 'BB' are shown: when the seeds are transferred after 45 days of stay at high temperature, the TTC overestimates the real germinability of the seeds and it seems that it is indifferent to consider the "dubious cases" alive or dead. On the contrary, when the seeds are transferred after 14 days the.two

estimations do not differ statistically if "dubious cases" are scored as alive. If FUS are added to PG, the values differ again (P=0.01), but now it is PG+APG+FUS to be higher than PG+TTC: this means that not all the FUS remaining after the stay at 350C are alive.

The information that on the Whole we can draw from these trials is that the TTC is equivalent to a germination test when the seeds are highly germinable (p.e. 'LV' seeds). When the PG is lower (p.e. 'BB'), the TTC may be an overestimation of seed value, because it tends to score as viable at least a fraction of those seeds which would not germinate in a germination test, but would remain as FUS. The identification of alive and dead seeds according to their different staining was quite easy in this experiment, and "dubious cases" are, on the whole, few: thus, the statistical significance of the comparison test is almost always unaffected by considering them alive or dead.

Literature

ASSOCIATION OF OFFICIAL SEED ANALYSTS, 1970, Tetrazolium Testing Handbook For Agricultural Seeds. Contr.NO 29 to The Handbook on Seed Testing, Don F.GRABE Ed.
INTERNATIONAL SEED TESTING ASSOCIATION, 1985, International rules for seed testing. Annexes 1985, Seed Sci. & Technol., 13, p. 356-513.
QUAGLIOTTI L., ROTA A.,1987, Research in-t-o the effect of some factors (environmental conditions, seed age, cultivar) upon the germination process of the eggplant. (Submitted).

Tab. 1 - Germinability at 20/300C and 3EOC of temperature, after 14 and 45 days.

	20/30°C		350C	
	14 d	45 d	14 d	45 d
'Long Violet'	99%	99%	93.4	93.4
'Black Bell'	78%	82%	37.1	58.6

Tab. 2 - Comparison (X) of TTC results with PG values at 20/300C of Temperature

	'Black Bell'	TTC		
dubious cases scored as:		dead	alive	
14 d	PG	*	**	
	PG+FUS	N.S.	N.S.	
45 d	PG	N.S.	*	P= 0.05
	PG+FUS	N.S.	N.S.	P= 0.01

Tab. 3 - Comparison O~) of [PG+TTC carried out on FUS] with [PG+PG increase following the transfer of the seeds at 20/300C after 14 and 45 days of stay at 350C] (+FUS)

'Black Bell'	PG+TTC (14d)		PG+TTC (45d)		
dubious cases scored as:	dead	alive	dead	alive	
PG+ PG	*	N.S.	**	**	*P= 0.05
PG+APG+FUS	**	**	**	**	** P= 0.01

ANNOUNCEMENTS

International Symposium on integrated Management Practices for Tomato and Pepper Production in the Tropics

It was held in Tainan (Taiwan, Republic of China) on March 22-25, 1988, organized in an axcellent way by the Asian Vegetable Research and Development Center (AVRDC).

Almost 200 participants of 32 all over the world States attented the Symposium. Sixty-four reports were presented, 36 of them concerning the pepper. Part of the reports dealt with country reports, while other sessions were devoted to varietal improvment, stress physiology, genetic resources, integrated pest management and production technology.

Visit of the participants to the AVRDC and to the field exhibition of tomato and pepper cultivars submitted by various Institutes and private seed companies was organized. An agricultural research and extension service (DAIS), a farmers' association and several farmers' fields of pepper and tomato were visited too.

The Proceedings of the Symposium will be published by AVRDC, Shanhua, Tainan, Taiwan, ROC.

List of the reports concerning the pepper
- Crop Improvment through biotechnology (R.A.Morrison and W.H.T.Loh, U.S.A.) - Multiple virus resistant Capsicum cultivars (B.Villalon, U.S.A.)
- Pepper breeding and genetics at New Mexico State University (P.W.Bosland, U.S.A.)
-The use of Capsicum chinense as sweet pepper cultivars and sources for gene transfer (S.S.Cheng, Brazil)
- Pepper improvement for the Tropics: problems and AVRDC approaches O.Y.Yoon, S.K.Green, A.T.Tschanz, S.C.S.Tsou and L.C.Chang, Taiwan)
- The importance of methodology in breeding for resistance to insect pest (M.J.Berlinger, Israel)
- Breeding tomatoes (Lycopersicon esculentum) and sweet peppers (Capsicum annuum) for heat tolerance and disease resistance in the Caribbean (G.Anais, French West Indies)
- Quantitative resistance to bacterial leaf spot on pepper compared in monoand polycyclic disease progress tests (A.M.Hibberd and M.E.Herrington, Australia)
- Additive gene action controlling resistance to bacterial leaf spot in a pepper plant introduction line (A.M.Hibberd, Australia)
- Breeding chilli pepper for powdery mildew resistance (A.A.Deshpande, N.Anand and C.S.Pathak, India)
- Abscission of reproductive structures in pepper: causes, mechanisms and controls (H.C.Wien, K.E.Tripp, R.Hernandez-Armenta and A.D.Turner, U.S.A.)
- Genetic resources of Capsicum for tropical regions (B.Pickersgill, U.K.)
- Genetic resources of tomato and pepper at AVRDC (C.S.Tay, Taiwan)
- Problems of seed production and storage in pepper (P.Belletti and L.Quagliotti, Italy)
- Ripe rot of pepper caused by Colletotrichum spp. O.F.Hadden and

L.L.Black, U.S.A.)
-Resistance to anthracnose (Colletotrichum spp.) in pepper (B.S.Kim, H.K.Park and W.S.Lee, Korea)
-Virus diseases of tomato and pepper in Queensland and some aspects of theri control O-E.Thomas, D.M.Persley and D.J.McGrath, Australia)
-Biological, chemical and physiological. Approaches to disease control of tomato and pepper (Y.Elad, Israel)
-The influence of shade nets on the growth and yield of sweet pepper (F.El-Aidy, M. El-Afry and F.Ibrahiem, Egypt)
-Irrigation and nitrogen management for bell pepper (Capsicum annuum) in tropical India (D.M.Hedge, India)
-Cultivation and production of tomato and pepper in China (C.Y.Yang, Z.T.Wei and S.D.Li, Thailand)
-Cultivation, production and reserach of tomato and pepper in Japan (T.Narikawa, K.Hida and Y.Sakata, Japan)
-Tomato and pepper production and research in Korea (K.Y.Kang, Korea)
-Tomato and pepper production in the Philippines O.M.Soriano, R.L.Villareal and V.P.Roxas, Philippines)
-Production and utilization of. tomato and pepper in Taiwan (C.Y.Lin, Taiwan)
-Tomato and pepper production and improvement in Thailand (M.Wivutvongvana and P.Lumyong, Thailand)
-Tomato and chilli pepper growing in Malaysia: current status, problems and research progress (N.M.Shukor, B.H.Chew, S.Noraini and M.N.M.Roff, Malaysia)
-Pepper and tomato production in Indonesia (H.P.Anggoro, Indonesia)
-Tomato and pepper: country report for India O.H.Singh and D.S.Cheema, India)
-Hot pepper and tomato. Major production constrains, research highlights and future trends of research in Ethiopia (Y.Haile and Y.Zewdie, Ethiopia) Present status and prospects for increased production of tomato and pepper in Northern Nigeria (I.D.Erinle, Nigeria)
-Tomato and pepper production and its problems in Liberia (M.A.AS.Saqui, Liberia)
-Tomato and pepper production and its problems in Sudan (A.M.Yassin, Sudan) Tomato and pepper production and research status in tropical Australia (D.J.McGrath, Australia)
-Tomato and pepper production in Brazil (H.Nagai, Brazil)
-Tomato and peppers in Mexico. Commercial production and research challenges O.A.Laborde and E.R.Poblete, Mexico)

Differential hosts for viruses

According to the conclusions of the VIth Eucarpia Meeting on Capsicum and Eggplant, prof. Gil Ortega tent us the following text.

"One of the conclusions of the Meeting was trying to decide a unique list of pepper genotypes as differential hosts for PVY, TMV, etc.. After the Meeting I held a conversation with Shlomo Cohen (Israel) and we thought it was convenient to profit the existence of Capsicum Newsletter to accomplish it.

Accordingly, in the case of PVY and TMV there exist proposals already published in literature. For PVY there is available that of GEBRE SELASSIE et al. Agronomie, 1985, 5 (7), 621-630 which could be summed up:

Differential	Pathotypes		
hosts	PVYO	PVY1	PVY1-2
'Bastidon'	+	+	+
'Yolo Y,	-	+	+
'Florida VR-2'	-	-	+
'Serrano Veracruz'	-	-	-

For TMV we dispose as base the information of BOUKEMA, Vth Eucarpia Meeting on Capsicum and Eggplant, Plovdiv (Bulgaria), 84-87:

Differential	Pathotypes			
hosts	PO	P1	P1-2	P1-2-3
'Early Calwonder'	+	+	+	+
'Bruinsma Wonder'	-	+	+	+
'Tabasco'	-	-	+	+
C.chinense PI 159236	-	-	-	+
C.chacoense PI 260429	-	-	-	-

I don't know the existence of similar proposals for other virus (CMV, AMV I ...) but readers are invited to do so through Capsicum Newsletter if there is some concrete proposal.

Besides I should ask for volunteers among the readers of Capsicum Newsletter and the members of ISHS working group on vegetable viruses, in order to multiply the lines of pepper that finally will be accepted as differential hosts; so that each differential host is multiplied at least by two researchers for the remaining persons using them. Once the list of volunteer researchers is done, the working team of Dr. Pochard (INRA) for PVY and Dr. Boukema (IVT) or Dr. Betti (Bologna) for TMV should be asked to provide them with a unique distribution of homozygotic lines of the differential host in order that they distribute the seeds to the rest of interested people. In this way it could be solved the fact that it is always Dr. Pochard who has to do the distribution of seeds.

I am at your disposal for any explanation or help."

REQUEST FOR SOURCES AND INFORMATION:

"SCOTCH BONNET" PEPPER SEED

Small agribusiness corporation seeks information and seed sources for the hot pepper variety commomly called "Scotch Bonnet" on the island of Nevis, West Indies. Peppers are rounded, average 45mm in diameter, are bright red-orange, and extremely hot. Agricultural advisors on Nevis are unable to provide us with the Latin name of this variety, which we desire to grow commercially on the island. we seek the Latin name and any source information on seed. A small supply of seed is available for your study. Please contact collect:

Octavia Porter Randolph, President, Oualie Ltd.

100 Fifth Avenue, Waltham, MA 02154 USA
(617) 240-5888 TELEX: 247316 ARTF UR ATTN:OUALIE

CAPSICUM GENETICS COOPERATIVE

P.W. Bosland

Agronomy and Horticulture Department, New Mexico State University, Las Cruces, N.M., 88003, U.S.A.

A Capsicum Genetics Cooperative (CGC) is being established in the Department of Agronomy and Horticulture at New Mexico State University, Las Cruces, New Mexico, USA for the purpose *of* acquiring, maintaining, and distributing seed stocks *of* various Capsicum species. Emphasis is on expediting a wide range *of* research in breeding, mapping, cytogenetics, molecular biology, plant physiology, entomology, phytopathology, ecology and other biological studies. Screen isolation cages and greenhouse facilities will be used for seed increase to maintain the genetic integrity of each stock. Seed stocks will be stored and maintained in Las Cruces with duplicate seed samples stored at the USDA Southern Regional Plant Introduction Station at Experiment, Georgia, USA. Seed is requested from those of you who have unique genetic stocks that you would like to share with others interested in Capsicum genetics. Summary reports and descriptions of the stocks held in the CGC, as well as an accounting of accessioning and distribution of stocks will be submitted annually to the EUCARPIA, CAPSICUM NEWSLETTER. Contained in the summary will be gene lists, allozymic variants, linkage groups, cytoplasmic variants and cytogenetic stocks such as trisomics, nullisomics, etc.

Anyone who has genetic material and would like to share with others should send seed to Dr. Paul W. Bosland, Agronomy & Horticulture Dept., Box 30003, Las Cruces, New Mexico, 88003-0003. In the case of stocks containing unique quantitative phenotypes, (e.g. wild populations or advanced breeding lines) thedonor should take the responsibility of supplying the necessary seed for maintaining the genetic integrity of that stock, a minimum of 1/4 ounce or eight grams should be sent.

All persons providing genes and stocks to the CGC will be recognized as the source of those traits. In the case where the supplier of a trait is not the originator of the -trait, the supplier should provide as much information as possible on the lineage and origins of the trait. A comprehensive file system of stock origins, stock development (lineage), maintenance and distribution will be maintained at Las Cruces. This information will become increasingly valuable to users of these stocks.

ANALYTICAL INDEX

Pepper

Eggplant

LIST OF THE RECIPIENTS

ALGERIA

-Ougouag B., Department d'Agronomy G6n6rale, Institut National Agronomique, EL HARRACH - ALGER

AUSTRALIA

-Gillespie D., Redlands Horticultural Research Station, Delancey Street, ORMISTON – Queensland 4163
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-Mac Grath D.J., Dept of Primary Industries, Horticultural Research Station, P.O.Box 538, BOWEN - Queensland 4805
-Presley D.M., Dept of Primary Industries, Plant Pathology Branch, Meiers Road, INDOOROOPILLY - Queensland 4068

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