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The picture in the cover is derived from the “Herbario nuovo di Castore Durante”,

Venetia, MDCXXXVI

<u>FOREWORD</u>

The third issue of "Capsicum Newsletter" comes out very late, owing to the difficulties we have met to print it.

As for the past, none of the contributions accepted have been corrected even when the text had to be retyped. Therefore the Authors only must be held responsible for both the scientific content and the form of the contributions.

Notwithstanding the financial problems are still to be solved, this third issue will be sent freed of charge to the contributors and to the University Institutes.

The number of contributions received seems to confirm the usefulness of "Capsicum Newsletter" and once again we are very pleased to contribute in the exchange of scientific in formations among research workers that deal with pepper5 all over the world.

Piero Belletti, Ornella Nassi, Luciana quagliotti

Institute of Plant Breeding and Seed Production
Of the Univeristy of Turin

Turin, 15th June 1985

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LIST OF THE AUTHORS

LIST OF THE CONTRIBUTIONS

Evaluation of Capsicum spp. Accessions and Cultivars in Palmira, Valle, Colombia – (October , 1982 – August, 1983)

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Pepper is native to America and amply used as a condiment in daily cooking. In Columbia, it is estimated that 850 Has were grown in 1979 basically of Bell Pepper types. Other cvs. Like 'Jalapeño', 'Anaheim,' C. annuum, and 'Tabasco'- (C. frutescens) are grown in small areas for hot sauces and export freesh. The Vegetables Crops Program (ICA, Colombia) has been collecting Capsicum spp. Since 1980 and has about 220 accessions in total (more than 50% are Colombian). All 5 domesticated speciesare represented. No previous evaluation or description had been made in the country. In 1982, we made a start to evaluate their potential as replacement of current cultivars and to identify materials useful in breeding.

Materials and Methods

Table 1 shows the 23 accessions tested and their provenance. Field planting involved 2 reps in a randomized complete block. Management was standard for the commercial crop in the region. Row pairs were separated by 1.7 m and plants, 0.5 m with 14 plant plot. Mites & aphids and Alternaria spp. were controlled with recommended pesticides.

IBPGR descriptor list (1 was used, and data was taken on number of commercial fruits per plot, mean and total fruit weight, fruits damaged with sun, Alternaria, etc. Harvest period was controlled for each accession.

RESULTS

Descriptors were used to determine species (Table 1). Yield data and fruit characteristics are shown in Table 2. The best cultivars in several agronomic characters were 'Anaheim' TMR 23, 'Jalapeño' (both accessions) and 'College' 64-L. Several accessions showed ver long survival period (for example, CM-334-PL, CM-331-PL, CATIE 781, CATIE 9831); this a character may be useful under tropical conditions, or may indicate root rot tolerance.

1. IBPGR. 1983. Genetic Resources of Capsicum. IBPGR Secretariat FAO, Rome, 48 pages.

2. ICA. 1979. Informe Annual de Progreso, 1977. Programa Nacional de Hortalizas. (Mimeografiado). Palmira, Colombia, 85 pages.

3. Jarmillo, J., M. Lobo. S.f. El Pimentón. In Hortalizas. Manual de Asistencia Técnica, ICA. Bogotà, Colombia. 555 pages

TABLE 2. DATA ON YIELD, FRUIT AND HARVEST CHARACTERS OF 23 CAPSICUM spp. ACCESSIONS (1982-1983)

USA											
'Jalapeño'	133	9.0	0.64	49	13.8	27.0	65.0	Red	9	121	188
Jalapeño pubescent'	003	10.3	0.74	47	15.7	27.0	71.3	Red	7	121	188
'Anaheim'	093	16.2	1.16	57	2.1	21.0	96.6	Brown	5	121	188
'Caloro'	097	6.1	0.44	36	12.4	30.0	69.0	Orange	5	121	188
'College' 64L	094	9.7	0.70	40	18.8	26.0	111.0	Gr/Red	1	143	202
'Rumanian Hot'	096	0.6	0.25	9	3.2	47.5	72.5	Orange	1	94	155
'Serrano Chili'	095	4.7	0.34	110	3.1	10.0	34.0	Red	9	121	188
MEXICO											
'CATIE' 8058	070	9.6	0.68	230	3.1	14.5	78.5	Orange	9	143	168
'CATIE' 10078-5	075	7.9	0.56	178	3.2	12.7	72.5	Red	8	121	188
CM-320	102	7.5	0.54	49	5.6	19.0	62.6		9	121	188
CM-331	104	3.8	0.27	98	2.9	15.0	75.0	Red	9	134	96
CM-334	101	.5	0.10	23	4.5	16.0	50.0	Brown	5	115	96
CM-338	103	2.8	0.250	36	5.5	20.0	40.0	Red	9	115	127
L-15-201	100	1.0	0.07	10	7.0	25.0	60.0	Brown	5	150	209
L-29	099	2.4	0.17	27	6.3	29.0	50.0	Orange	5	94	
GUATEMALA											
'CATIE' 6137	068	11.6	0.83	394	2.1	14.0	37.5	Orange	5	134	174
'CATIE' 7800-6	086	6.5	0.46	84	5.6	28.0	47.5	Or/Red	8	121	188
'CATIE' 7801	069	12.0	0.86	514	1.6	18.3	32.5	Orange	1	134	188
'CATIE' 10628	074	8.0	0.57	600	1.0	13.0	26.3	Orange	9	150	188
COSTA RICA											
'CATIE' 9832	071	3.6	0.26	276	1.0	11.0	29.6	Yellow	9	143	174
'CATIE' 9925-6	072	5.8	0.42	289	1.5	17.4	20.0	Red	9	143	168
COLOMBIA											
'AjiNariño'	060	9.8	0.70	119	6.1	23.0	30.6	Red	1	150	133

/1/ This number refers to the IBPGR Descriptor list (2) pages 31-49.

TABLE 1. ACCESSIONS TESTED IN PALMIRA, COLOMBIA

NAME	ACC. No	SOURCE (1)	ORIGIN	CAPICUM SPECIES
'Jalapeño'	133	ICA	EEUU	Annuum
'Jalapeño pubescent'	003	ICA	EEUU	Annuum
'Anaheim' TMR-23	093	Peto	EEUU	Annuum
'Caloro'	097	Peto	EEUU	Annuum
'Rumanian Hot'	096	Peto	EEUU	Annuum
'Serrano Chili'	095	Peto	EEUU	Annuum
'College' 64-L	094	Peto	EEUU	Annuum
L-29	099	INCA-CAEB	México	Annuum
L-15-201-P-5 (x)	100	INCA-CAEB	México	Annuum
CM-334-PL	101	INCA-CAEB	México	Annuum
CM-338-PL	103	INCA-CAEB	México	Annuum
CM-331-PL	104	INCA-CAEB	México	Annuum
CM-320-(x)2	102	INCA-CAEB	México	Annuum
'CATIE'-10078-5	075	CATIE	México	Undefined
'CATIE'-8058	070	CATIE	México	Frutescens
'CATIE'-6137	068	CATIE	Guatemala	Frutescens
'CATIE'-7801	069	CATIE	Guatemala	Frutescens
'CATIE' 7800-6	086	CATIE	Guatemala	Undefined
'CATIE' 10628-1	074	CATIE	Guatemala	Frutescens
'CATIE' 9832	071	CATIE	Costa Rica	Frutescens
'CATIE' 9925-6	072	CATIE	Costa Rica	Frutescens
Aji : El Tambo	060	ICA	Colombia	Baccatum
Aji: Cali	066	ICA	Colombia	annuum

(1)
ICA, Palmira, Colombia
INIA – CAEB, Celaya, Guanajuato, México
CATIE, Turrialba, Costa Rica
Peto, Seed Co., Saticoy, CA, EEUU

CAPSICUM COLLECTION IN THE PERUVIAN CENTRAL AREAS

M.L. Gómez-Guillamón and J. Cuartero
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New series of Capsicum collections were carried out in central Peruvian areas (Huanuco, Ucayali, Cuzco and Apurimac) in October 1983 by Spanish C.S.I.C. investigators, in co-operation with the Peruvian I.N.I.P.A.

Ther here with Table shows the sampled areas, recollected types and reference numbers as well as some of most outstanding characteristics.

Sample number	Site Altitude	Local name	Fruit characteristics
Departamento of Huanuco			
P-26	Tingo María 700 m	Aji color rocoto	7-10 cms long. Elongate fruits Yellow before ripeness
P-27	Tingo María 700 m	Aji Amarillo	10 cms long. Elongate, pointed fruits. Yellow.
P-28	Km. 51 Lima-Pucallpa (Tingo María) 700 m	Pukunuchu	2 cms long. Conical fruits. Red.
Departmento of Ucayali			
P-29	La Divisoria 1500 m	Chichín	3-4 cms long. Conical fruits with interlocular depressions
P-30	La Divisoria 1500 m	Rocoto	7-8 cms. Long. Rectangular fruits Red.
P-31	Caserío Primavers (Pucallpa) 150 m	Charapilla	1 cm. Long. Globose fruits. Yellow.
P-32	Caserío Primavers (Pucallpa) 150 m	Ají dulce	6-7 cms. Long. Campanulate fruits. Yellow before ripeness.
P-33	Caserío Primavers (Pucallpa) 150 m	Malaguete, Pinguits de mono	1-2 cms. Long. Elongate, pointed fruits. Red.
P-34	Mangual (Pucallpa) 150 m	Ají dulce	10-12 cms. Long. Elongate, pointed fruits. Red.
P-35	Mangual (Pucallpa) 150 m	Ají picante	2-3 cms. Long. Globose fruits. Orange-Red.
P-36	Pucallpillo (Pucallpa) 150 m	Ají	3-4 cms long. Globose fruits. Orange-Red.
P-37	Pucallpillo (Pucallpa) 150 m	Chintillo	1.5 cm long. Pear-shaped fruits. Orange.

Sample number	Site Altitude	Local name	Fruit characteristics
Departamento of Ucayali (cont.)			
P-38	Pucallpillo (Pucallpa) 150 m	Ajicito	2 cms. Long. Conical fruits. Orange.
P-39	Pucallpillo (Pucallpa) 150 m	Ajicito	1.5 cm long. Globose. Oranged.
P-40	Pucallpillo (Pucallpa) 150 m	Ají picante	1 cm. Long. Globose, pointed fruits. Red.
P-41	Pucallpillo (Pucallpa) 150 m	Charapilla	1 cm. Long. Globose fruits. Oranged.
P-42	Pucallpillo (Pucallpa)	Punkunuchu	2 cms. Long. Pear shaped fruits. Oranged.
Departamento of Cuzco			
P-44	Amaybamba 1000 m	Rocoto rojo	5 cms. Long. Cylindrical fruits. Red.
P-45	Aranjuez (Quillabambe) 1000 m	Ojo de pez	1 cm. Long. Spherical fruits. Yellow-greenish before ripeness.
P-46	Aranjeuz (Quillabambe) 1000 m	Marate	1 cm. Long. Elongate, pointed fruits. Red.
P-47	Santa Ana 1000 m	Ají	5-7 cms. Long. Elongate fruits. Red.
P-48	Santa Ana 1000 m	Marate	Similar to P-46.
P-49	Santa Ana 1000 m	Incamarate	4-5 cms. Long. Elongate fruits. Red.
P-50	Santa Ana 1000 m	Piris	4 cms. Long. Ovoidal fruits. Red.
P-51	Calzada (Echárate) 1000 m	Rocoto rojo	4 cms. Long. Cylindrical fruits. Red.
P-52	Echárate 1000 m	Kiton-Kiton	2 cms. Long. Globose fruits. Ivory before ripeness
P-53	Echárate 1000 m	Piris	1.5 cms. Long. Pear-shaped fruits. Red.
P-54	Echárate 1000 m	Piris	1.5 cms. Long. Elongate, pointed fruits.

Sample number	Site Altitude	Local name	Fruit characteristics
Department of Cuzco (cont.)			
P-56	Echárate 1000m	Marate	Similar to P-46
P-57	Chuyamayo (Huayopata) 1300 m	Ají verde	10 cms. Long. Elongate fruits. Red-wined.
P-58	Huayopata 1400 m	Ají colorado	15 cms. Long. Elongate fruits. Red.
P-59	Huayopata 1400 m	Ají amarillo	5 cms. Long. Elongate fruits. Yellow.
P-60	Sicre (Huyayopata) 1650 m	Marate	Similar to P-49.
Departamneto of Apurimac			
P-61	Bella Vista (Abanay) 2300 m	Piris	Smilar to P-54, but longer.
P-62	Bella Vista (Abanay) 2300 m	Rocoto rojo	5 cms. Long. Pear shaped fruits. Red.
P-63	Bella Vista (Abanay) 2300 m	Rocoto amarillo	4-5 cms. Long. Cylindrical fruits. Yellow.
Samples from local markets			
P-64	Ambo (Hyanuco)	Ají limeño	7 cms. Long. Elongate, pointed fruits. Red.
P-65	Ambo (Hyanuco)	Amarillo selva	3-4 cms. Long. Elongate, pointed fruits. Yellow before ripeness. Oranged.
P-66	Ambo (Hyanuco)	Ají forma rocoto	4-6 cms. Long. Elongate, pointed fruits. Red.
P-68	Pisaq (Cusco)	Ají naranja	10 cms. Long. Elongate, pointed fruits. Orange.
P-69	Pisaq (Cusco)	Rocoto	4-5 cms. Long. Globose fruits. Red.

These materials are in reproduction and characterization phase and samples will be provided to colleagues upon request. Adress correspondance to:

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COLLECTION AND EVALUATION OF PEPPER GERMPLASM IN TURKEY

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Pepper is one of the basic and traditional vegetable crops in Turkey of great economic importance.

Since 1978, with the reorganization of National Plant Genetic Resources Project, the exploring and collecting local varieties of pepper have been started, in order to store them as germplasm fro future breeding works.

Pepper is mainly grown in small gardens run by single families as many other vegetables and generally it is reproduced on the farm itself. The cultivated areas are scattered all over the country with is bigin size and has a broad range of environments. Only since few years commercial lot of seeds has begun to be used and some new cultivars have been developed -

It is absolutely necessary to collect and preserve the 1ocal varieties before the disappearance of such material which most of them are primitive cultivars and have wide range of variation in many characters

In last six years, 176 different populations of pepper have been collected from south-east (Gaziantep, Urfa, Mardin, Diyarbakir, Siirt, Bitlis, Hakkari, Van Muş, Bingöl, Elaziǵ, Malatya, Adiyaman, Kahramanmaraş), north-west (Çanakkale, Edirne, Tekirdağ, Kirklareli, Isbanbul, Kocaeli, Sakarya, Bursa, Balikesir), and north-east (Erzurum ,Ağni, Kars Artvin, Rize, Trabzon, Giresun) part of Turkey.

The seed samples were evaluated manily in relation to the some morphological features (fruit shape, fruit, length, fruit position, mature furuit colour) and fruit pungency.

The following table shows number of samples f or each character.

FRUIT SHAPE	99 Conical	37 Bell	30 Elongate	6 Oblate	4 Round
FRUIT LENGTH	57 Short	67 Medium	52 Long		
FRUIT POSITION	118 Declining	58 Erect			
FRUIT COLOUR	174 Red	1 Yellow	1 Orange		
FRUIT PUNGENCY	121 Sweet	55 Pungent			

GENETIC RESOURCES OF CAPSIUM IN ITALY

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After 5 years or work, the collection of pepper germplasm of the Institute of Plant Breeding and Seed Production, University of Turin, has reached 125 accessions, maily belonging to the Capsicum annuum species.
37 of them are old local varieties and ecotypes, found directly among the farnersm 57 are commercial varieties sended by seed's firms and 31 are foreign varieties (originating from Marocco, Tunisia, Egypt, Korea, Thailand and Brazil), obtained by exchange with material of the collection.
27 of the collected accessions have been regenerated, because of the low number of seed obtained.
The seeds of the gathered material, after the normal laboratory evaluation, are kept at temperatures of –20°C.
In the meantime the gathered material is characterized through the cultivation of some plant and the survey of the features, according to the International Board of Plant Genetic Resources "descriptor list of Capsicum".
Some accessions are available for exchange with germplasm banks or research Institutes. They are the followings.

	(a)	(b)	(c)	(d)	(e)
'Braghese quadro'	Yellow	230 g	Bell	5 mm	sweet
'Lungo'	Red	115 g	Conical	4 mm	Sweet
'Braidese 3-4 punte'	Yellow/red	145 g	Bel	5 mm	Sweet
'Braidese precoce'	Yellow/red	185 g	Bell	5 mm	Sweet
'Capriglio'	Red	70 g	Conical	8 mm	Low
'Cajenna'	Red	20 g	Elongate	2 mm	Intermediate
'Corno di bue'	Yellow/red	115 g	Conical	4 mm	Sweet
'Corno di toro'	Yellow/red	115 g	Conical	4 mm	Sweet
'Cravinin di Chieri'	Yellow/red	70 g	Round	7 mm	Sweet
'Spagnolin'	Red	15 g	Round	4 mm	High
'tomaticot'	Yellow/red	120 g	Round	6 mm	Sweet
'Cuneo'	Yellow (90%) red (10%)	180 g	Bell	6 mm	Sweet

(a) fruit colour
(b) mean weight of fruit
(c) shape of fruit
(d) thickness of the pericarp
(e) pungency

CAPSICUM, AN IMPROTANT SPICE IN ETHIOPIA

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Hot pepper or "berbere" is an indispensable spice in the national Ethiopian dish. It is the main constitutent of the sauces ("wots") which are eaten with the "injecra", a soft and spongy sour dough bread preferably made of teff (Eragrostis tef). Traditionally the Ethopians distinguish three kinds of hot peppers a) "berbere" the red mature pungent fruits b) "karya", the immature green fruits, and c) "mitmita", the small very pungent red fruits.

Since the majority of the hot peppers are still being produced in the backyards by the individual farmers, only a rough estimate can be given of the annual production. Considering an average yield of approx. 420 kg of dried fruits per ha and accepting a figure of 230,000 ha of hot peppers the annual production is about 700,000 t.

The Plant Genetic Resources Centre/Ethopia at Addis Abeba has so far collected a total of 92 Capsicum accessions. Because of priority, these accessions have not yet been evaluated. However in order to obtain an impression of the phenotypic variation in Ethiopian hot peppers, a small amount of different hot peppers was bought at "Mercato" in Addis Abeba. From these a random seed sample was taken and planted at Addis Abeba (2350m above sea level). A total of 28 plants were finally grown and described for 29 descriptors, following the IBPGR descriptor list (1983). No or little variation was observed for the flower and seed characteristics. However, of the 28 plants 26 had very distinct fruits. Of the 28, 21 had one pedicel/axil, 4 sometimes had 2 and 3 had pedicel/axil.

Furthermore, 17, 10 and 1 plants had pendant, intermediate and erect pedicel position at anthesis respectively. The rest of the observations are presented in Table 1. A comprehensive report is given in the PGRC/E:ILCA Germplasm Newsletter No. 6.

TABLE 1. Variation for some characteristic in a random Capsicum seed sample expressed in mean, c.v. and range.

Descriptor	Descriptor states	Mean	C.V.	Range
1. Fruit length in cm		7.4	3.63	2.5 – 13.4
2. Fruit diameter in cm		1.6	24.80	0.95 – 2.3
3. Number of fruit	1=very few; 5=interm. 9=very many	4.2	36.9	1 – 7
4. Fruit pungency	1=very low; 5=inerm. 9=very high	6.0	28.7	3 – 8
5. Plant height in cm		41.9	36.8	18 - 77

GROWTH RESPONSE TO LOW TEMPERATURES IN NURSERY OF PEPPER AND EGG-PLANT

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The behaviour of 20 cultivars of pepper (C. annuum L. v. grossum) and 16 cultivars of egg-plant (S. melongena L.), grown at 5, 5, and 12°C night temperature for 6 weeks, was examined. Size of cotyledons, height of seedlings, number of leaves and width of apical leaves were measured.

The pepper cultivars with the higher growth at low night temperatures were: ‘Bell Boy’, ‘Melody’, ‘Blue Star’; but these cultivars showed also higher differential growth between 5, 5°C and 12°C night temperatures.

The egg-plant cultivars with lower differential growth were: ‘Ebany’, ‘Fabina’, ‘Black Bell’, ‘Milionire’, these cultivars showed a differential level of growth in nursery but a good yield was obtained.

The growth in nursery may be utilized for the early selection of cultivars adapted to low temperatures growing, in pepper cultivars but not in eggplant cultivars, in relation to the correlation coefficient found with early ness and yielding characters.

EVALUATION OF SWEET PEPPER ASSORTMENT

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Sweet pepper (Capsicum annuum L.) assortment was tested as regards the production of red-matured fruits, nutritive factors, morphological characteristics and organoleptic properties. The experiments were preformed with Czechoslovak cultivars (‘Ambra’, ‘Citrina’, ‘Erekta’, ‘Jubilantka’, ‘FruKta’, ‘Granàt’, ‘Karmen’, ‘Morava’, PCR, ‘Perla’, ‘Rubin’) and foreign cultivars (‘Budai csìpös’, ‘Budai édes’, ‘Fehérözön’, ‘Podarok Moldavy’, ‘Szarvasi’, ‘Golen Califonia Wonder’).

In ten years experiment the Czechlovak cultivars had the share of red-matured fruits 30-63%. Ascrobic acid retention after sterilization was 29-56%. By sensory evaluation we found differences in cultivars mostly due to taste, odour and consistence. The results show the suitable cultivars for canning in technological mauturity: ‘Citrina’, ‘Granàt’, ‘Jubilantka’ and ‘Perala’. For processing in physiological maturity the best were ‘Frukta’, ‘Karmen’ and ‘Morava’. From foreign cultivar ‘Szarvasi’ gave the best results.

AGUSTÍN V., 1959. Study of technological quality of tomato, sweet pepper and pickling cucumber. Výskumná práca VÚ LIKO, Bratislava.

VALŠÍKOVÁ M., 1983, Evaluation of the Genetic Potential of Sweet Garden Pepper Assortment. Sbornìk UVTIZ – Zahradnictivì, 10, /2/ : 151 – 156.

VALŠÍKOVÁ M., KOPEC., BREZOVICKÝ L., 1982, The Changes in the Quality of Preserved Sweet Garden Pepper of Different Cultivars. Rostl. Vyroba, 28/12/ : 1315 – 1320.

VALŠÍKOVÁ M., CHRENKO J., 1983, Contents of asorbic acid and beta-carotene in different varieties of vegetable pepper preserved by sterilization. Bulletin PV XII, 3 : 185 – 190.

RIPENING OF SWEST PEPPERS AND THEIR EVALUATION

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Ripening as an important quality factor take a sigmoidale course. Linearization of sigmoidale courves is possible by pro-bit analysis. The process of ripening is characterized with sufficient precision by obtained straight lines.

Probit analysis was used for evaluation of our own experiments. Percentual values of ripening degree was transformed to tabulated probit values (Finney 1952). Typical ripening course of pepper fruits was evaluated for cultivars PCR, Granát, Jubilantka at various condition (temperature 0, ±9, ±l8, ±20 and + 25 °C). In some experiments were used pretreatment with 50% CO_2 during 1-5 days and with Ethrel. Probit analysis make possible more exactly to evaluate and prognosticate the course and the halftime of ripening. At 25 °C the half-time of ripening was 7, 9-13 days, at 0 °C it was 74 days.

FTNNEY LA., 1952, Probit analysis . Cambridge University.

KOPEC K., VALŠÍKCVÁ M., 1984, Ripening of Tomatoes and Sweet Peppers and their evaluation by means of Probit analysis. ISHS Symposium “Quality of Vegetables”, As, Norway.

‘TROPICAL CW-3’: A GOOD QUALITY PEPPER FOR TROPICAL CONDITIONS

L. Munoz and A. Prats

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Academia de Ciencias de Cuba.

A good quality bell pepper variety was obtained in Cuba which reproduces true type and has good stability in tropical conditions; it is very uniform, has a potential yield higher than 40 t/ha and produces more than 75% of suitable fruits for export market.

HORMONAL CONROL OF GROWTH AND YIELD IN PEPPER (Capsicum annuum L.)

M. M. Joshi

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External application of hormones influences different development stages in plants. It is widely adopted in practice to control the growth and the yield in various crop plants and vegetables.

Starting eight days after transplanting of diploid (2n = 24) seedlings of Capsicum annuum, solutions of Gibberellic acid (GA_3) and Naphthalene acetic acid (NAA) were sprayed separately at some concentrations of 10, 20, 40, and 50 ppm for 1, 2, or 4 times with ten days intervals.

Of the GA_3 treatments, 10 ppm showed induction of appreciable vegetative growth, precocity, the highest and mean fruit weight. 20 ppm treatment gave slightly lower or higher values for these parameters than those with 10 ppm. However 40 and 50 ppm treatments applied 4 times accelerated apical development, induced large yellowe green leaves, flower abortion on lateral shoots and the lowest yield. NAA brought about degeneration of floral buds at first flowering node and eloayed flower production at second and third nodes. Low doses of NAA induced slight increse in growth and yield per plant, while 50 ppm treatment recorded the highest yield and mean fruit weight. Moreover, low doses of GA_3 proved to be the most promising ones in enhancing growth and yield.

POLLEN QUALITY IN PEPPER AS RELATED TO EARLIENESS

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Sweet pepper cultivation in glasshouse in the Netherlands, has the disadvantage of a very log period of vegetative growth before fruit production starts. Especially the large blocky fruit types (Califiornia Wonder) are relatively late setting. At IVT part of the collection of Capsicum annuum has been screened for earliness under Dutch winterconditions. This contribution reports on differences for in virto pollen germination as it affects fertilization and earliness of fruitset in pepper.
Plants were set out 6-12-1983 in a glasshouse and grown at 23/17°C (D/N) in three repetitions of 5 plants each. Dates of first flowering and of first fruitset were recorded. Three groups of 5 cultivars each, were chosen to represent the three classes listed below; (see table 1)

A. early flowering, early fruitset (half Dec. resp. half Jan.)
B. early flowering, late fruitset (half Dec. resp. end Feb.)
C. late flowering, late fruitset (end Feb. resp. end March)

In vitro germination was measured three times: on 5/3, 15/3 and 27/3. On each date two pollen samples of each repetition of all cultivars were put on a drop of medium, containing 5% saccharose and 0.5% agar, and kept at 25°C and 100% RH in the light. After three hours we stopped pollen germination by adding a drop of fuchsin acid in lactophenol. Percentages of germination were calculated of a random sample of 300 pollen grains and the length of the pollen tubes was measured of at random 30 pollen grains per sample from photographic enlargements projected onto a screen.
Pollen germination of group A was for each date significantly higher than that of group B and C, while group B and C did not differ significantly.
Within group B cv'Hodonin' germinated better than the others. The cultivars take an intermediate position between group A and B, also with respect to the delay between flowering and fruitset.
Pollen tube lengths did not significantly differ between groups. Especially in group A the mean pollen tube length varied between cultivars, with spice pepper vcs 'Hatvani" and 'Westlandia' having the shortest pollen tube. Within each group and even within almost all cultivars the germination percentages increased with time during March, probably due to increasing day length and light intensity. It can be concluded that early fruit set in pepper under non-optimal conditions depends at least in part on good pollen germination. This explains the differences between cultivars witch flower equally early but differ in the beginning of fruit set.
Late flowering is an expression of a different balance between vegetative and generative growth. The late flowering group C has the strongest vegetative growth. Pollen quality should be an effective selective character for breeding peppers for early production under glasshouse conditions.

Table 1: Time between flowering and fruit setting, and pollen germination and the pollen tube growth of pepper cultivars on culture-medium.

Cultivars	Days between flowering & fruitset	Mean percentage of pollengermination on			Mean length of pollentubes on 15/3
		5/3	15/3	27/3	
‘Hatvani’	30	24	37	68	137
‘Poznanska Slodka’	15	30	51	54	224
‘Sivry 600’	22	16	28	42	184
‘Sweet Banana’	22	32	62	61	200
‘Westlandia’	36	9	32	39	146
Mean	25	22	42	53	178
‘Hondoni’	52	18	38	44	247
‘Jubilanska’	64	3	10	32	170
‘Moraska’	79	5	15	14	148
‘Severka’	85	5	27	33	207
‘Yellow Belle’	74	12	16	27	166
Mean	71	9	21	30	188
AC 2165	26	4	21	32	178
‘Bruinsma Wonder’	27	4	26	24	200
‘Delphin’	23	3	17	19	195
Plutona’	41	13	28	31	185
‘Vinette’	26	4	12	16	204
Mean	29	5	21	25	193

‘FLOWER DROP’, A YIELD LIMITING FACTOR AND ITS POSSIBLE CONTROL IN PEPPER (Capsicum annuum L.)

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Fruit set in pepper is very small in proportion to the number of flowers produced. Needless to say the flower drop is one of the major limiting factors in reducing yeld of chillies. A check to the process should prove promising to improve the yield.

Starting ten days after initiation of flowering of diploid (2n = 24) plants of a local variety of Capsicum annuum, 25 and 50 ppm aqueous solutions of B-phthoxyacetic acid (NOA) were sprayed 1, 2, or 3 times with two week intervals. A common control was maintained for all the treatments.

Untreated populations showed a heavy flower drop and of the total number of flowers produced only 10-12% set fruits. NOA applied at 25 ppm, effectively reduced flower drop and enhanced the percentage of flowers setting fruits to 15-18% when applied 3 times. However, 50 ppm NOA proved to be the most effective in controlling the flower drop and maximum percentage (20-25) of flowers setting fruits could be recorded with its application for three times. Application of B-naphthoxyacetic acid at optimum concentration in appropriate developmental stages appears to be a possible means of controlling flower drop and improving the yield.

A STUDY OF PEPPER COLOUR INHERITANCE BY THE CIE 1976 SYSTEM

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Colour coordinates of commercially ripe pepper fruits were recorded by the Hungarian three-stimuli colorimeter MOMCOLOR D. Preliminary studies showed that best information regarding commercially ripe (not botanically ripe) pepper fruit colour is obtained by the parameters b*, L* and Cab* (Milkova et al. 1983). The aim of the present study was to assess the mode of inheritance of these parameters in F1 hybrids between parent cultivars with different fruit colour (‘Soroksari’ - yellow green, ‘Albna’ – green, and ‘Kourtovska kapiya’ – dark green).

Hybrid combination	Parameter	d/a	ΔEab *	
			$F_1 - P_1$	$F_1 - F_2$
‘Soroksari’ x ‘Kourtovska kapiya’	B*	6.78	18.41	7.82
	L*	-0.46		
‘Soroksari’ x ‘Alvena’	B*	0.55	9.35	5.33
	L*	-0.12		
‘Alvena’ x ‘Kourtovska kapiya’	B*	0.67	5.60	6.99
	L*	-0.13		

Data presented in Table 1 show that the hybrid combinations studied differed in their inheritance of d/a (Falconer 1960). Over dominance in b* values was evident in ‘Soroksari’x ‘Kourtovska kapiya’, but in ‘Soroksari’ x ‘Albena’ and ‘Albena’ x ‘Kourtovska kapiya’ the inheritance of these values was partially dominat. In the three bybrid combination, not with standing the differences in parent fruit colour, partial dominance of the dark coloured cultivar was observed for the L* value. Data about colour differences (Δeab*) showed that they are greatest between hybrid fruits and cv. ‘Soroksari’, the parent with lightest (yellow-green) fruit colour.

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SOME HETEROSIS MANIFESTIONS IN PEPPER (Capsicum annuum L.)

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Vast research was carried out on heterosis in peppers at the Institute of Genetics. A number of features were established, explaining the nature of the heterosis effect as follows:

One of the factors that have a bearing on higher earliness and total yields with heterotic cultivars of peppers is the lower percent of falling-off of flowers.

The heterosis effect is also found to be linked with the average number of seeds per fruit - “Reproductive heterosis”.

The uniformity of fruits characteristic of the heterotic cultivars correlates positively with the equal number of seeds per fruit, and the 1000-seed weight and the size of embryo per fruit of the heterotic varieties is higher, resp., larger than the same indices of the parental cultivate. All this has shown that the heterosis effect is manifested immediately after fertilization and influences the formation of seeds.

The experiments, concerning the effect of ecologic conditions have revealed that the heterotic cultivars with their hybrid character are adapted more readily to unfavorable conditions of growing, and, therefore, are more suitable to growing for early field production or growing under greenhouse conditions.

BREEDEING FOR LATENESS IN PEPPER

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Lateness may be practically defined as relatively long period from sowing to harvesting most of the yield.

In the Arava region of Israel the growers can not manipulate sowing dates beyond 2-3 week periods since eventually the decrease in night temperatures prevent normal pollen development and fruit set.

Hence genetic variation in lateness (earliness) may play important role on the time commercial yield can be harvested.

The crop is usually directly sown in August and harvested during December-January.

An attempt was made to breed late cultivars that can yield during February-March.

Surprisingly, from a cross between ‘California-Wonder’ and ‘Bighart-pimento’ exceptional late individuals were obtained – in F2 generation. Such trans

Gressive segregation could result from complementary genes for lateness present in both parents. So far stable late lines were obtained typified by slow growth fruit development. Such lines yield 3-4 weeks later than the standard bell cultivars in a single harvest.

RESISTANCE IN A MUTANT OF PEPPER TO SIX ISOLATES OF PHYTOPHTHORA CAPSICI

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A resistant mutant was recently recognized from seeds Yolo Wonder, a pepper (C. annuum L.) cultivar susceptible to Phytophthora capsici L., which were irradiated with gamma rays. The mutant was named line 704 in M_5 (2).
This line has been tested with six isolates of P. capsici showing different virulence and coming from three Italian provinces.
The growth medicum of the fungus and the techniques of plant inoculatin were performed as described previously (1).
The results, shown in Fig. 1, indicate the presence in the line 704 of a high degree of resistance, in comparison with the two different varieties of Yolo Wonder used as controls.
The resistance of the line 704 seems to be horozontal, as already suggested in a previous paper (2).

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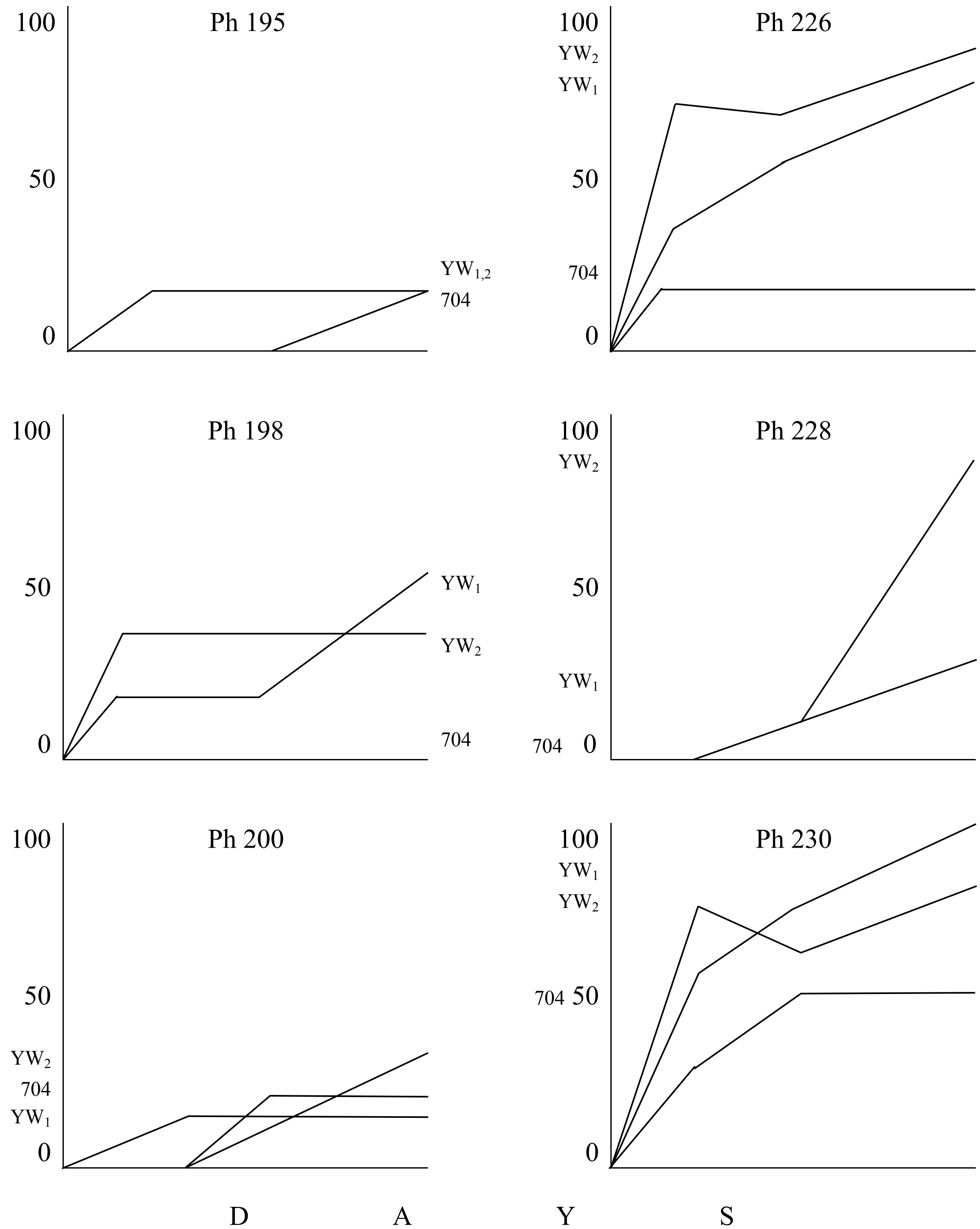
PERCENTAGE OF PLANTS INFECTED

Fig. 1. – Percent of infected plants of two cvs of Yolo Wonder, and the resistant line 704; 5, 10 and 20 days after the inoculation with six different isolates of <u>Phytophthora capsici</u>.



Pepper response to Phytophthora capsici Leon zoospore inoculation.

I. Influence of temperature and fungus isolate

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An experiment dealing with the influence of the fungus isolate and temperature on the pepper (Capsicum annuum L.) response to Phytophthora capsici -zoospore inoculation by the Kïmble and Grogan (1960) method, was carried -out.

Eight rows, each 7 - 8 cm apart, were seeded in each one of ten trays. Every row was randomly assigned to each one of the eight pepper varieties shown-in Table 1. Plantlets, 20-30 per row, in the, 4-to 6-leaf stage were inoculated by pouring 1 1 of the zoospore suspension (300,000 zoospore/cc) into each tray (300 x 10^6 zoospore/tray). On November 12, 1982, every two trays were inoculated with each one of the four strains of P. capsici isolated - from pepper, shown in Table 2. The remaining two trays were kept non inoculated. Four inoculated and a non inoculated trays were placed in a climatized greenhouse for 2 months with air temperatures of t_{max}: 25.0 ± 3.7°C, t_{max}: 15.7 ± 2.5°C. The other set of five trays was exposed for the same - in a cooler greenhouse to air temperatures of t_{max}: 18.8 ± 2.9°C, - t_{max}: 12.0 ± 1.3°C. The number of dead plants was recorded at 2-3 - day intervals. Two months after inoculation, all the surviving plantlets were check ed in their root system, counting those with any visible damage. From the recorded data, percentages of dead plants were computed and, after transformation by the Bliss' Table, the analysis of variance was made.

RESULTS

On the control trays no dead plants were recorded.

Pepper variety resistance response was dependant temperature while the - fungus isolates used in the inoculation by zoospores did not interact. The susceptible varieties 'INIA 65-4' and 'INIA 106', were more attacked at -- high than at low temperature. Similar behavior was demonstrated for 'Phyo 636' which shows a quick progression of infection at high temperature in - contrast with the rest of partially resistant and resistant varieties, which were not affected in their response by temperature. Differences in resistance between varieties could be already established 20 days after inoculation. A clearer differentiation could be made at the highest temperature -and, in some cases, by recording data for as long as two months (Table 1). The tested P. capsici isolates showed generally speaking more aggressiveness at the high temperature, although the individual isolate behavior was - dependent on temperature in the case of 'Ej' , which is more aggressive at - high temperature, 'B1' showing the reverse tendency. Differences between -isolates could be established at the lowest temperature already 20 days after inoculation, but could not be demonstrated at the highest temperature (Table 2).

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TABLE 1. Average percentages of dead plants, 20 days and 2 moths after inoculation with zoospores of P. capsici on eight, pepper varieties at – two temperature levels.

VARIETIES	10 days Temperature		2 months Temperature	
	High	Low	High	Low
INIA 106	100 a	74.6a	100 a	88.7 a
INIA 65-4	100 a	74.7a	100 a	78.6ca
Phyo 630	38.8 b	8.9bc	51.2 b	11.1 bc
No. 2	45.8 b	38.7b	50.0 b	39.8 b
Line No. 10	12.6 bc	11.9bc	12.6 c	11.9 bc
Line 49`	4.2 c	3.4c	6.3 c	3.4 c
Line 493	1.8 c	2.0c	1.8 c	3.5 c
Serrano Crio-110 de Morelos 334	0.0 c	2.3c	1.7 c	5.6 c

TABLE 2. Average percentages of dead plants 20 days and 2 moths after inoculation with zoospores of four P. capsici isolates, at two temperature levels.

ISOLATE	20 days Temperature		2 month Temperature	
	High	Low	High	Low
B1	43.0 a	61.1 a	51.4 a	69.1 a
S75	38.7 a	21.9 b	40.1 a	22.9 b
La	31.3 a	23.9 b	35.4 l	30.6 b
Ej	36.7 a	0.3 c	39.4 a	0.7 c

Mean separation in Tables 1 and 2 by Newmans-Keuls test, 5% level (For the graphic expression of such a separation, letters in the vertical direction and straight lines in the horizontal direction were used).

<u>Pepper response to Phytophthora capsici Leon zoospore inoculation.</u>
<u>II. Influence of plant age and inoculation dose.</u>

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An experiment dealing with the influence of plant age and inoculation does on the pepper (<u>Capsicum annuum</u> L.) response to <u>Phytopathora capsici</u> zoo --- spore inoculation by the Kimble and Grogan (1960) method, was carried out.

Ten trays, each one divided into three parts and each part into three rows, were used. Every row was randomly assigned to each one of the three pepper varieties show in Table 1. Every part of the tray was sown at random in the following dates: 28/03/83, 12/04/83 and 27/04/83 in order to obtain – differently aged plantlets (15-25 per row) at the inoculation time.

Zoospores were produced in order to inoculate on 03/06/83 with 450 cc/tray (50 cc/row x 9 row/flat) at the three following doses: Low, 2,000 zoospore/cc (2,000 zoospore x 450 = 900,000 zoospore/tray; this is approximately the same amount of zoospore/tray as used by Kimble and Grogan (1960)), medium, 300,000 zoospore/cc and high, 600,000 zoospore/cc (600,000 x 450 = 270 x 10^6 zoospore/tray; this is approximately the same amount of zoospore/tray as previously used by the authors (Gil Ortega <u>et al</u>., 1984). Each concentration was repeated in three trays so as to have nine trays inoculated and one control tray. After inoculation, the ten trays were placed in a climatized greenhouse with air temperatures of t_{max}: 26.7 ± 2.4°C, t_{min}: 18.0 ± 2.1°C for 2 months. Data recording and computing was done as explained by Gil Ortega <u>et al</u>. (1984).

<u>RESULTS</u>

On the control tray on dead plants were recorded.

The tested plant ages at inoculation time did not significantly influence the response of pepper varieties to inoculation. .

The interaction 'variety x dose' was only significant ($p \leq 0.001$) in the 20 day after inoculation recordings. The significance (Table 1) is due to the different percentages of susceptible 'INIA 224' plants reached with the low dose (approximately 1/3 of dead plants) and the medium and high doses (100% of dead plants). That interaction, however, did not mean that the tested varieties were differently classified by the three doses.

The dose of 300,000 zoospore/cc (450 cc/tray) was enough in order to obtain a quick response (20 days) (Table 2). At that time pepper varieties classification by resistance was the same as 2 months after inoculation but a clearer differentiation could be made when considering susceptible plants those showing any root lesions (Table 3).

<u>REFERENCES</u>

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TABLE 1. Average percentages of dead plants 20 days after inocuation with P. capsici on three pepper lines at three zoospore doses.

Doses/ VARIETIES (zoospore/cc)	INIA 224	Phyc 636	Line 491
High (600,000)	100 a	1.9 c	0.9 c
Medium (300,000)	100 a	0.9 c	0.5 c
Low (2,000)	32.7 b	0.0 c	0.1 c

TABLE 2. Average percentages of dead plants 20 days and 2 months including as susceptible plants all those showing root lesions, after inoculation with P. capsici at three zoospore doses.

DOSES (zoospore/cc)	20 days	2 months	2 months (including plants with root lesions)
High (600,000)	23.1 a	32.7 a	45.6 a
Medium (300,000)	30.0 a	30.6 a	41.5 a
Low (2,000)	4.5 b	19.1 b	31.4 a

TABLE 3. Average percentages of dead plants 20 days, 2 months including as susceptible plants all those showing root lesions, after inoculation with P. capsici zoospores on three pepper lines.

VARIETIES	20 days	2 months	2 months (including plants with root lesions)
INIA 224	90.0	99.3 a	99.3 a
PHYO 636	0.6	0.7 b	12.4 b
LINE 491	0.5	0.6 b	3.5 c

Means separation in Tables 1, 2, and 3, by Newmans-Keules test, 5% level.

Pepper response to Phytophthora capsici Lcon mycelial inoculation
Influence of temperature and fungus isolate

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The resistance response of nine pepper (Capsicum annuum L.) varieties was found to be dependenct on the P. capsici isolates, during the periods 0-7, 7-14, 14-21 and 21-35 days after inoculation by the Pochard and Chambonnet (1972) method, while no interaction 'isolate x variety' was detected in the 0-3 day period (Table 1). Interactions 'temperature x variety' were also found (Table 2). The interactions 'temperature x isolate' were fond to be of no biological significance. The different isolates grew at a higher rate at the higher temperature (t_{max}: 25.7 + 3°C; t_{min}: 15.9 ± 3°C) than at the lowest one ($_{tmax}$: 19.0 ± 3°C; t_{min}: 12.3 ± 1°C).

The response of the breeding line 'No 2' was dependent on temperatures and isolates. The interactions 'isolate x variety' and 'temperature x variety' were found to be caused by the different behavior of a susceptible variety set ('INIA 65-4', 'INIA 106', 'INIA 224', 'INIA 225') and a resistant one but not by a different response of the resistant genitors (Lines '491' and '493' from Smith et al., 1967) to P. capsici pathotypes or to different temperatures.

As to susceptible varieties, infection speeds were higher at high tan at low temperature, while I resistant varieties the more resistance they show, the more independent they were from temperature and earlier they were so (Table 2).

The best differentiation between both variety sets was obtained in the last records because infection speeds were always higher in susceptible varieties than in resistant one (Table 1).

We had not detected any interaction 'isolate x variety' when inoculating with zoospores in previous experiments (Gil et al., 1984). However, the resistance behavior of some breeding lines such as 'No 2' and 'Phyo 636' was different from their behavior in the trial reported here. It could be concluded that both inoculation methods gave quite similar results on the resistant genitors although on the breeding lines, they would evidence different aspects of the resistance mechanism.

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TABLE 1. Mean speeds (mm/week) of mycel progression of four P. capsici isolates on the stems of nine pepper varieties in different periods after inoculation.

Period Isolate/ Variety	0 - 7 Ej	B1	S75	Ca	7 - 14 Ej	B1	S75	Ca	14- 21 Ej	B1	S75	Ca	21 - 35 Ej	B1	S75	Ca
Line 493	11,0c	15,1b	12,5c	4,5c	0,6c	1,3b	0,4c	0,2c	0,6b	0,7b	0,3b	0,7b	0,0b	0,1a	0,0b	0,4a
Line 491	12,0c	13,0b	11,8c	2,6c	1,0c	1,4b	1,2c	0,6c	0,9b	0,3b	0,3b	0,6b	0,2b	0,1a	0,0b	0,6a
Phyto 636	18,8c	19,9b	19,0c	5,1c	4,3c	4,3b	3,9c	0,6c	3,1b	2,9b	2,7b	1,1b	3,4a	1,0a	2,7a	0,8a
Line No 10	22,3bc	21,3b	18,4c	5,1c	8,0c	7,1b	9,8c	0,1c	2,1b	3,1b	1,7b	0,6b	1,8ab	1,5a	2,0ab	0,3a
No 2	30,9b	20,1b	14,0c	4,8c	37,6b	13,9b	6,2c	1,4c	23,6a	8,0b	6,0b	1,8b	-	-	-	-
INIA 106	40,4a	51,6a	29,0b	16,9	57,2a	54,0a	29,1b	26,5b	24,2a	36,0a	18,9a	18,6a	-	-	-	-
INIA 224	42,5a	49,2a	39,5a	26,9a	52,5a	62,2a	49,0a	37,4ab	-	-	-	-	-	-	-	-
INIA 65-4	46,8a	50,8a	29,8b	26,7a	56,3a	58,7a	27,6b	44,8a	-	-	-	-	-	-	-	-
INIA 225	52,1a	58,1a	45,2a	34,0a	56,7a	57,8a	55,3a	48,0a	-	-	-	-	-	-	-	-

Table 2. Mean speeds (mm/week) of P. capsici mycel progression of the stems of nine pepper varieties at two temperature levels in different periods after inoculation.

Period Temp. / Variety	0 - 3			0 - 7			7 - 14			14 – 21	21 – 35
	Low	High	Mean	Low	High	Mean	Low	High	Mean	Mean	Mean
Line 493	12,0c	15,8d	13,9ef	11,8c	9,6e	10,8e	1,0d	0,2,d	0,6e	0,6c	0,1b
Line 491	8,7c	15,4d	12,1f	11,6c	8,4e	10,0e	1,6d	0,5d	1,0e	0,5c	0,2b
Phyo 636	11,9c	22,5d	17,6de	13,7c	17,9d	15,9d	4,9d	1,9d	3,3e	2,5c	2,0a
Linea No 10	8,6c	30,6c	20,8d	14,9c	19,9d	17,7d	8,5cd	5,2d	6,7e	2,0c	1,6a
No 2	12,4c	22,3d	17,2de	16,3c	18,8d	17,5d	15,7c	13,8c	14,8d	9,8b	-
INIA 106	18,5b	36,7b	27,6bc	27,7b	41,2c	34,5c	38,7b	47,1b	42,9c	24,4a	-
INI 224A	11,6c	39,6b	26,0c	28,8b	80,2b	39,5b	39,5b	61,7a	50,3ab	-	-
INIA 65-4	19,7b	41,8b	311b	28,2b	48,8b	38,5b	38,7b	55,0ab	46,8bc	-	-
INIA 225	24,8a	49,7a	37,6a	38,1a	56,6a	47,3a	50,0a	58,9a	54,4a	-	-

Mean separation in Table 1 and 2 by Newmans-Keules test, 5% level (For the graphic expression of such separation, letters in the vertical direction and straight lines in the horizontal direction were used).

STUDIES ON VARIETAL DIFFERENCES AND INHERTIANCE OF RESISTANCE TO PHYTOPHTORA CAPSICI IN RED PEPPERS OF KOREA

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Phytophthora capsici is one of the most important diseases that influences greatly yield of red pepper. It is very difficult to cultivate red pepper continuously in the greenhouse because of various soil-borne diseases. Of these soil-borne diseases, P. capsici has been know as an important disease which infects rapidly and can survive in soil for along period of time.

Materials and Methods

Various degree of resistance to P. capsici among the varieties were examined in 1980. 21 lines of 19 varieties from 48 lines of 45 varieties were identified as resistant, and they were classified as resistant to the 11 different isolates of P. capsici collection from several regions.

Combinations of resistant lines (102-2-8, 77-10-54) derived from 'Gimjang gouchu', 'Shinpyong No. 1' and the susceptible variety Saegochu were made to clarify the inheritance of resistance P. capsici in peppers.

The mycelium of P. capsici was isolated in potato dextrose agar using the part of infected plants collected from several regions. And it was isolated with microscope (x 400). For the multiplication f P. capsici, Hodgson's media were used from 7 days and zoospores were developed under florescent light for 36-40 hours.

Inoculum of P. capsici was controlled to make zoospores per the range of vision of microscope (x100) to be 8 to 19. 5 ml of inoculum per plant were inoculated into the soil 40 days after the seedlings were transplanted in plastic pots of 9 cm in diameter, when leaf age was bout 6 to 8.

Results and Discussion

1. Varietal responses to isolates of P. capsici

Table 1 showed that 8 lines of 6 varieties, including K S 2-2, were highly resistant to all the isolates of P. capsici collected from 11 regions. To others were resistant to the isolates collected in one or two regions only. 'Putgochu', 'Hungarian wax' and 'Saegochu'were very susceptible to all the isolates. This result agrees with Polach 's report showing varietal differences regarding the reactions to the *23* isolates obtained from infected red peppers; and tomatoes. It is assumed that differences of resistance among varieties was attributed to the fact that pathogenici ty of P. capsici I was diversified by the cultivation environments me in southern are as of a Korea red pepper is usually grown in a greenhouse and in the field in central and northern part.

2. Analysis of gene resistant inheritance.

As shown in table 2, all plants were resistant to disease in the F_1 generation of 'Gimjanggochu' (102-2-8) x 'Saegouch', and in the F2 populatin 170 plants were resitant in backcrossing to 'Gimjanggouch' but I backcrossing to 'Saegouch' the rate was 1:1. Similar results were obtained with the sam erate when 'Sinpyong No. 1' was crossed with 'Seagouch'.

In the combination of 77-10-54 line of 'Gimjanggouchu' and 'Saegouchu', all plants were resistant in F1 generation but in F2 population the ratio of resistant to susceptible plant was 5:1. Therefore, it was considered that Korean local varieties resistant of P. capsici have one or two couples or resistant genes.

This result agrees with report by Smith that in analysis of gene resistant inheritance of red pepper to P. capsici found one or two couples of dominate genes.

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STUDY OF PHENOLIC CONSTITUENTS OF RESITANT AND SUCEPTIBLE LINES OF CHILLIES (CAPSICUM ANNUUM) IN RELATIN TO ANTHRACNOSE DISEASE.

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Chilli (Capsicum annuum) is an important condiment corp. Anthracnose (Collectotrichum capsici (Sydow) Butter and Bisby) continues to be its most serious disease & is widespread in India. Present studies were undertaken at Indian Institute of Horticultureal Research, Bangalore to reveal quantitative difference, if any, in the total phenols of resistant and susceptible lines of chilies to anthracnose disease.

Five lines of chilies were chose for the present study. Three lines viz. 307-10, 314-1 and 344-9 were resistant and two lines viz., 292-2 and 310-3 were susceptible. Seeds were sown in June, 1981 and the seedlings were transplanted after 45 days. Thirty days after transplanting the leaves were clipped off from all the five lines. Total phenols in themselves were determined by the method of A.O.A.C. (1965). The phenol equivalent was expressed in terms of tannic acid. The total phenol content in the resistant lines307-10, 314-1, 344-9 was 344, 425 and 460 mg/100 g of fresh leaf material respectively. In the susceptible lines 292-2 and 310-3 the phenolic contents were 515 and 460 mg/100 g of fresh weight respectively. However, the phenol contents in the resistant line (344-9) and susceptible line (310-3) were same i.e. 410 mg/100 g fresh weight. Thus the study revealed that phenolic contents of different lines were variable without showing any relationship with their resistance.

INHERITANCE OF RESISTANCE TO ANTHRACNOSE DISEASE IN CHILLIES

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Anthracnose (<u>Collectrotrichum capsici</u> (Sydow) Butler and Bisby) in Chillies is a serious disease and has been reported to disease yield by 10-75 per cent. These are no report in literatutre pertaining to the mode of inheritance of resistance to this disease. Experiments were conducted at the Indian Institute of Horticultural Research, Bangalore to study the genetic architecture of resistance to Anthracnose.

Three resistant parents viz., 307-10, 314-1, 344-9 and two susceptible parents vis., 292-2 amd 310-3 were used in this experiment. The six generations namely P1, P2, F1, F2, B1 and B2 of five crosses were planted in Kharif 1981. The plants were spray inoculated after transplanting and visually scored for disease severity. Based on the number of spots per leaf a grading scale of 0-5 was used. The data were analyzed both quanlitatively (chi-square test) and quantitatively (generation mean).

Resistance to anthracnose was found to be inherited as a recessive character. The data did not fit with any of the simple genetic ratios as show by the chi-square test. The results of quantitative analysis (generation mean) indicated that additive (d), dominance (h), additive x dominance (j) and dominance x dominance (l) gene effects contribute to the inheritance of resistance. The cross combnations showed higher magnitude of dominance effects rather than additive effects. The epistatic gene effects were also of considerable importance. Thus inheritance of resistance to anthracnose disease is of continuous nature and governed by both additive and non-additive genes. Hence it is advocated to going for bi-parental crosses to exploit both types of gene actions involved.

COMBINING SOURCES OF RESISTANCE TO BACTERIAL SPOT IN *CAPSICUM*

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Following our finding that resistance to bacterial spot (*Xanthomonas campestris* pv. *vesicatoria*) in 3 plant introductions of Capsicum annuum was due to 3 different sources of resistance. We hoped that the different genes would interact in a complementary fashion producing a level of resistance measurably greater than any of the original resistance introductions. We screened 10 F3 populations, 3 parent lines and 1 susceptible cultivar under conditions designed to overcome the levels of resistance introductions. There were 15 to 20 individual-plant replications of each entry except for population 27-2 which had only 7. Plants were classified for mean lesion size and percentage of leaves infected. Of our resistant introductions, PI 322719 had a mean lesion diameter of 1.3 mm with 92% leaves infected, PI 163192 had a mean lesion diameter of 1.0 mm with 79% leaves infected, while PI 163189 had a mean lesion diameter of 1.0 mm with 69^ leaves infected. In contrast, line 27-9 had a mean lesion diameter of 0.42 mm and 33% of its leaves were infected and line 20-6 had a mean lesion diameter of 0.30 mm and 15% of its leaves were infected. Line 20-6 was selected from PI 163189 x PI 163192 and line 27-9 was selected from PI 163192 x 322719. We believe that these resistant lines carry genes from different sources acting in a complementary manner to produce a level of resistance greater than is found in any original Plant Inventory sources.

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SOME OBSERVATIONS ON THE USE OF TMV RESISTANT PEPPER VARIETIES

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Pepper stains of TMV, isolate in the period from 1977 to 1983 and test on 10 commercial pepper cultivars being sold as TMV resistant, have been shown to possess varying degrees of virulence, this being higher in the more recently isolate strains (Betti et al, 1984). All of the cultivars tested were systematically infected by all the pepper strains without showing no any hypersensitive reaction; however, when the infection was caused by the strains which had been collected more recently, the degree of tolerance in the test cultivars gradually decreased, until it disappeared altogether. For such behavior-to which we have already given the name "selective host plant pressure" – there are two possible explantatins:

- gradual selection, from a natural population created over a period of years, of more and more virultent strains;
- induction of new strains (mutants) during the course of the infection cycle.

Whatever the cause may be, the result is the development of TMV population that is increasingly aggressive and damaging to the pepper.

The above observations seem to make the following statement of Yarwood's (1979) particularly appropriate: "Mutations of pathogens are the nemesis of the plant breeder".

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RESISTANCE TO TMV IN CAPSICUM CHACOENSE HUNZ. IS GOVERNED BY ALLELE OF THE L-LOCUS

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Resistance to all isolated Dutch stains of TMV was found in C. chacoense accessions PI 260429 and SA 185 (Boukema, 1983). I already concluded that the resistance gene (XX) of C. chacoense was either another allele of the L-locus, like the resistance genes found in different Capsicum species (Table 1), or a gene non-allelic to this locus in addition to one of the genes L_1 or L_2.

Progenies from crosses made in order to distinguish between these two hypotheses were obtained and tested for resistance to different TMV strains with the detached leaf method, as described before (Boukems, 1983). Results of these tests (Table 2) suggests that the resistance gene from C. chacoense PI 260429 is another allele of the L-locus or is closely linked to it, because (1) all plants of progeny 1 shoed local lesions after inoculation with strain $P_{1.2}$, which overcomes the resistance of L_1 and L_2 (Table 1), and (2) all plants of progeny 2 without lesions after inoculation with $P_{1.2}$ also did not show lesions with P_o. If the resistance genotype of C. Chacoense had been XXL^1L^1 or XXL^2L^2, 25% susceptible plants would have segregated in progeny 1 after inoculation with $P_{1.2}$ and 50% of the plants of progeny 2 without lesions after inoculation with $P_{1.2}$ would have shown lesions with P_o. I propose to designate this allele L4.

The segregations of progeny 2 deviated significantly from 1:1 (X^2=6.06; $0.01<p<0.05$). This may be caused by the fact that it is a progeny of an interspecific cross. Progeny 1 segregated with $P_{1.2.3}$ as expected in 1 resistant: 1 susceptible (X^2=0.96: $p>0.25$).

Whether the resistance genes from SA 185 and PI 260429 are the same can only be concluded after the F2 from the cross between both accessions has been tested. It is just another L-allele can only be concluded after races appear which overcome the resistance of L^4.

As the problems with male sterility met in interspecific crosses with C. chacoense are likely to be overcome (Boukema, 1984), it should be possible to incorporate L4 in C. annuum cultivars. The partially fertile F1 of the cross C. annuum x C. chacoense was, like the reciprocal male sterile F1, resistant.

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Table 1. Relation between genotypes for resistance in Capsicum and pathotypes of TMV (after Boukema, 1983).

		TMV pathotypes			
Capsicum cv or accession	Resistance genotype	P_o	P_1	$P_{1.2}$	$P_{1.2.3}$
C. annuum cv. 'Early Calwonder'	L+L+	+	+	+	+
C. annuum cv. 'Bruinsma Wonder'	L1L1	-	+	+	+
C. frutescens cv. 'Tobasco'	L2L2	-	-	+	+
C. chinense PI 159236	L3L3	-	-	-	+
C. chacoense PI 260429 and SA 185	?	-	-	-	-

+ = systemic mosaic, susceptible; - = local lesions on inoculated leaves, no systemic mosaic, resistant.

Table 2. Reaction of detached leaves of progenies from crosses between C. chacoense PI 260429 (XX), C. annuum cv. 'Early Calwonder' (L^+L^+) and C. chinense PI 159236 (L^3L^3) to TMV pathotypes P_o, P_1, $P_{1.2}$ and $P_{1.2.3}$.

Progeny	Po		P1		P1.2		P1.2.3	
	1	N1	1	N1	1	N1	1	N1
1. (XX x L^3L^3)L^+L^+	14[1)]	0	-	-	91[2)]	0	22	29
2. (XX x L^+L^+) L^+L^+	13[3)]	23	-	23	43	23	43	-

1 = local lesions, resistant; nl = no local lesions, susceptible; - = not tested.

1) number of plants tested; 2) part of the plants tested with $P_{1.2}$ are testd with P_o and $P_{1.2.3}$; 3) plants showing local lesions to P_o also do so to $P_{1.2}$ and $P_{1.2.3}$.

IN VITRO SHOOT TIP CULTURE OF PEPPER INOCULATED BY TOBACCO MOSAIC VIRUS /TMV PO/

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Shoot tip culture of plants as a remarkably simple basic technique offers several possibilities for the exact in vitro study of genetic, physiological and ecological parameters. The possibilities of in vitro shoot tip culture of Capsicum species were described earlier /FÁRI and CSILLÉRY, 1983/. Recently, we selected a breeding material of C. annuum cytoplasm suitable for microporpagation by in vitro shoot tip culture /FÁRI et al., 1984/.

In our laboratory the shoot tip culture of pepper /C. annuum/ was inoculated by the tobacco mosaic virus /TMV FO strain/ in vitro. Several genotypes, methoda of inoculation and growning conditions were examined. About 90 per cent of the sensitive genotype /L^+, Javitott Cecei/ showed mosaic symptoms on the leaf at five weeks' age the mean virus concentration being 13.2 ug/g fresh weight. The resistant genotype /L^3, Cecei, selected by CSILLERY/ showed neither mosaic symptoms nor virus /Table 1./

LITERTURE

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Table 1. Inoculation of shoot tip culture of Capsicum by TMV FO strain

Characteristics	Sesitive genotype /L^+/ Inoculated	Non inoculated check	Resistant genotype /L^3/ Inoculated	Non inoculated
Plant /fresh weight/ cg	40	53,1	44, 8	68, 6
Mosaic plants /%/	90	0	0	0
Virus concentration /ug/g fresh weight/	13, 2	0	0	0

ORGANOGENETIC COMPETENCE IN HYPOCOTYLS AND COTYLEDONS OF CAPSICUM ANNUUM CULTURED IN VITRO.

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Until now the expression of morphognetic capability in Capsicum cell culture has not yielded results achieved with other solanaceous members. This capability depends on genetic factors and culture conditions. We are interested in the hypothesis that single cells or protoplasts isolated from tissues previously induced into competence, may sustain easier regeneration. (1). Therefore we have studied some conditions able to stimulate organogenesis within seedling tissues and we have carried out histological observations to locate the origin of organ primordial.

Hypocotyl and cotyledon explants from three weeks old seedlings of var. grossum, logum, abbreviatum, were aseptically cultured on MS medium, enriched with various amounts of BA (0/4 ppm) and IAA (0/2 ppm). Swelling of explants, callus formation, shoot and root regeneration were scored weekly.

Both root and shoot neoformation has been paralleled by more or less intensive production of callus, which did not seem involved in differentiation of earlier organs. Connected wit the kind of explants, the main difference regards root differentiation, as new roots were produced by hypocotyls more frequently than by cotyledons (50 % vs 10%). Otherwise, caulogenesis occurred at the same rate in both kinds of explants. According to Fari and Czako (2) and to Gunay and Rao (3), in our experience the apical portion of hypostyle is able to produce shoots more than the basal one. Both auxin (IAA) and cytokinin (BA were needed to address morphogenesis towards shoot differentiation: the maximum rates of shoot production (70-90%) have been achieved wit 1 ppm of IAA and 2 ppm of BA.

Histological observation of explants showed the direct origin of new organs: buds arise from epidermiclayers (exogenous origin), while roots originated from the inner tissue, near the vascular bundles in hypocotyls and near the midrib in cotyledons (endogenous origin).

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IN VITRO GRAFTING OF A NON-DEVELOPING PLANTLET OF CAPSICUM FRUTESCENS X CAPSICUM CARDENASII HYBRID PRODUCED BY EMPRYO CULTURE

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The mobilization of the genetic potential of Capsicum genus can be realized in programmes of interspecific crossings. The success of crossing Capsicum species can be increased by embryo culture. /PICKERSGILL, 1980; PUNDEVA and ZAGORSKA, 1982; FÁRI et al., 1983/. A part of the interspecific hybrids gives fertile progenies, or can be maintained by mircrpropagation or preserved for crossing by grafting onto rooted stocks. It happeneds quite frequently that the plantlets of the embryo culture are weak, have not roots, are distorted and being plated out from in vitro culture are not-viable. In principle the hybrids can be saved in three ways:

- in callus forms new plants can be regenerated from thy hybrid callus /e.g. the theory of CUSTERS, and BERGERVOET, 1984 concerning Cucumis interspecific hybrids/
- mainteneance by micropropigation
- in vitro grafts onto appropriate stocks

Carrying out our interspecific hybridization programme we could stimulate the growth of only one embryo from the crossing C. frutescens x C. cardenasii. The plant reached the size of few centimeters and had no roots when this growth stopped and stagnated for moths. The change of the nutrient substrate had no roots when this growth stopped and stagnated for months. The change of the nutrient substrate had no positive effect either. Meanwhile, a shoot tip culture of C. frutescens-9 /in the 8th passage/ was available in our laboratory so employing it as a subject seemed obvious, and thus the hybrid plant could by stimulated to growth by in vitro grafting and could be planted out with the strong roots of C. frutescens.

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LINKAGE BETWEEN AN "ANTHOCYANIN LESS" AND A "MOSAIC" GENE

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The first genetic linkage was described by Peterson /1959/. Between the O gene of round fruit shape and the A group of purple fruit color the frequency of crossing over is 6.5 per cent while it is 20.6 per cent between purple fruit color and the G_1 gene of waxy fruit color. During the last 25 years linkage analyses were scarce. Pochard's group localized 12 genes on different chromosomes by trisomic techniques (1977, 1982) but no linkage has been mentioned between the partial resistance to CMV of 'Perennial" and the susceptibility to TMV. In a backcross prgrammme close linkage was found between the L gene of TMV resistance and a gene causing lack of anthocyanin described by Csilléry, as only 3.39 per cent of the individuals with green stem were resistant instead of the expected 75 per cent, while 96.61 per cent were sensitive instead of the expected 25 per cent (Csillery , 1980).

Carrying out research work in the field of pepper mutants nearly 100 spontaneous mutants have been found and our collection has been completed with 130 further mutants received from colleagues ready to co-operate. These mutants have been found or produced in varieties and breeding lines of different phenotypes. While carrying on collecting mutants we would like to study the existing ones in a variety background of the same penotype (isogenic line). For the purpose of this programme we have produced a line of light green fruit, with the size of 14/2 centimetres, containing the anthocyanin less (al-2) gene of Daskalov (1973) and the genetic male sterilerile genes (ms-3) fond also by Daskalov (1968). 52 mutants have been crossed so far with the mother of al-2, ms-3 genotype mentioned and the F_2 generation has been analyzed but linkage has been found only between al-2 and a mosaic-leaved (mos-2) mutant (Csilléry, 1980). Twenty F_1 plants have been sampled from al-2 x mos-2 combination. In the F_2 progenies, totaling 3,001 plants only three phenotypes have been found (1,409 al-2+/. Mos-2+/.: 709 al-2+/., mos-2/mos-2: 883 al-2/al-2, mos-2+/.) as the double recessive (al-2, mos-2) has not apprearred at all. Several F_2 plants were sampled representing all the three phenotypes in order to study the supposed genetic linkage. The segregation rates of F_3 generation are considered additional proofs of linkage. In 27 F_3 families derived from al-2+/., mos-2/mos-2 plants only one segregated from green stem /46 al-2+/., mos-2/mos02 : 16 al-2/al-2, mos-2/mos-2/, whereas in 55 F_3 families derived from al-2/al-2, mos-2+/. plants 2 were segregating for mosaic leaf (64 al-2/al-2, mos-2+/. : 17 al-2/al-2, mos-2/mos-2). The 37 F_3 families segregating for both recessives did not show double recessive in a total 931 plants (510 al-2+/., mos-2+/. " 190 al-2+/., mos-2/mos-2 : 231 al-2/al-2, mos-2+/.), i.e. reproduced the ratios of the original F_2. Two of the sampled F_2 families, however, segregated for an apparently new chlorophyll less, lethal /xantha/ mutant, which makes the expression of the mosaicism.

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MALE AND FEMALE FERTILITY IN INTERSPECIFIC CROSSES WITH CAPSICUM CHAC0EHSE HUNZ.

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During an inheritance study of the resistance of the C.Chacoense accessions P1260429 and 5A185 to all isolated Dutch THV strains, interspecific crosses with these accessions were made. Boukema (1983) already reported that th.e F_1 of the cross C.Chacoense x C.Annutim and the $B_{1,2}$ (C.Chacoense x C.Annuurn) x C.Annuum were completely male sterile with abnormal flowers. More results on male and female fertility of these and other crosses with a resistant selection of P1260429 are reported here.

Nine plants of the above mentioned F_1 were all female fertile as before (Boukema, 1983). They had a mean fruitset of 65% and about 6 seeds per fruit when pollinated with C.annuum cv 'Early Calwonder' (EC). The $B_{1,2}$ plants, however, differed for female fertility. After pollination with C.Annuum (EC) the fruitset of the 21 plants studied ranged from 0 to 75% and the number of seeds per fruit from 0 to 20. The resulting B_{22} plants (23 observed) were again completely male sterile. Plants of both backcross generations and F_1 plants also formed parthenocarpic misshapen fruits, although F_1 plants to a lesser extent.

F_1 plants of the cross C.chacoense x C.chinense P1159236 were also completely male sterile. This agrees with the results of Csillery (1983). After pollination with C.annuum EC the mean fruitset of 10 F_1 plants was on average 80% with on average S seeds per fruit. The plants resulting from this cross (>60 observed), were all male sterile too.

In an attempt to avoid this supposedly cytoplasmic form of male sterility the reciprocal cross C.annuum EC x C.chacoense .was made. Fruitset was 17% after 23 pollinations made. Only 9 of the 49 plants grown from this progeny turned out to be hybrids. The flowers of these 9 F_1 plants were normal, but pollen fertility as measured by in vitro germination was very low (Table 1). This also agrees with the results of Csillery (1953). After selfing these F_1 plants, the fruitset was <7%, while pollination with C.annuum gave over 20% fruitset. Fruits are not yet mature enough to observe seedset.

The sterile F_1's of the crosses between C.chacoense and C.annuum and C.chinense respectively, were backcrossed with C.chacoense to check if male fertility could be restored. The resulting $B_{1,1}$ plants showed more or less normal flowers but pollen fertility was very low (Table 1). Similar results were obtained by Andrasfaivy and Csillery (1953) with crosses between C.annuum and C.baccatum var. pendulum.

These results suggest that the male sterility of the interspecific crosses with C.chacoense can be overcome, although with difficulty.

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TABLE 1. Appearance of anthers and pollen fertility as measured by in vitro germination in progenies from crosses between C. chacoense PI260429 sel.1. (C), C. annuum cv ‘Early Calwonder’ (A) and C. chinense PI159236 (I).

Cross	Number of plants with		Pollen
	Flat or no anthers	Normal anthers	Fertility in %
(A X C)		9	0 – 5
(C X A) X C	3	6	0 – 10
(C X I) X C	1	3	0 – 2
C		5	60 – 75

AN ADDITION TO THE LIST OF POSSIBLE INTERSPECIFIC CROSSES TN CAPSICUM

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Capsicum frutescens and C.praetermissum are difficult to be crossed (Heiser and Smith, 1958; Csilléry, 1983). Only Heiser and Smith (1958) succeeded to obtain a single C.praetermissum x C.frutescens hybrid plant, giving very scarce data about it.

We managed to realize successful crosses in both directions, using two patterns from C.frutescens (cv.Tabasco' and 'Chile picante') and one from C.praetermissum (C 343).

C.frutescens x C.praetermissum. 12,76% successful crosses, 20,83% viable seeds (with cv.'Tabasco only). F_1 hybrids are intermediate in their habit. The corolla is Waxy, with a purple edge. The yellow-greenish spots on its base (from C.praetermissum) and the blue anthers (from C.frutescens) are dominant features. The plants are completely sterile (0% pollen stainability and no fruits in close and open pollination).

C.praetermissum x C.frutscens. 17,14% successful crosses, 9,37% viable seeds (with cv'chile picante' only). F_1 hybrids are intermediate in their habit too. The flowers are waxy, with small yellow-greenish spots and dark blue anthers. Unfortunately we have not yet enough satisfactory explanation to the domination of the waxy color of C.frutescens over the purple one of C.praetermnissum. The plants have 2,84% stainable pollen. A few fruits are formed in open pollination.

RELATIONSHIP OF LOW TEMPERATURE GERMINABILITY AND ENDOGENOUS ABSCISIC ACID LEVELS IN PEPPER SEEDS (Capsicum annuum L.) Kwan Soon Choi

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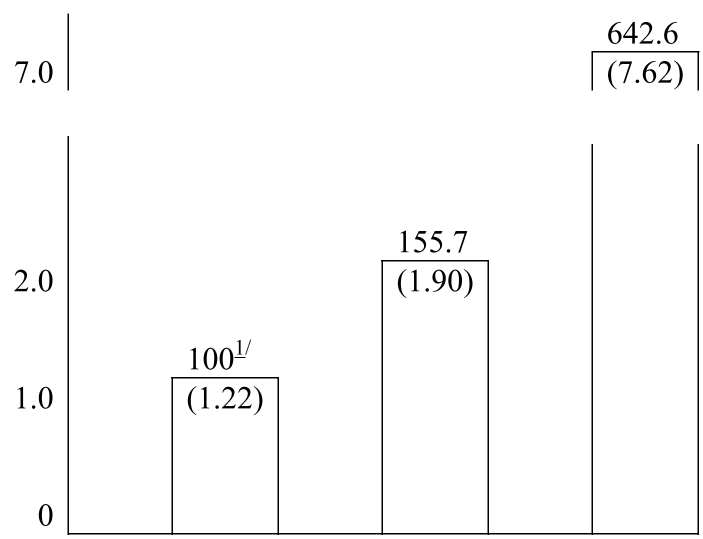
Seed germination could be controlled by several endogenous substances. Abscissic acid (ABA) is known as a main inhibitor in seed germination of several crops such as cotton. However, few in— formations on ABA effect on pepper seed are available at present. This experiment was initiated to determine the level of ABA in pepper seeds and its physiological role on seeds germination of several cultivars at low temperature.

Materials and Methods

'Saegochu', 'Daehwacho' and 'Mexico' pepper seeds, which have high, medium and low germinability at low temperature respectively, were used in this experiment. Sterilized seeds were placed in petridishes at 10°C and sampled periodically for ABA analysis. Samples for ABA analysis were.extracted by Jeong's method and evaluated by Gas chromatography.

Results and Discussion

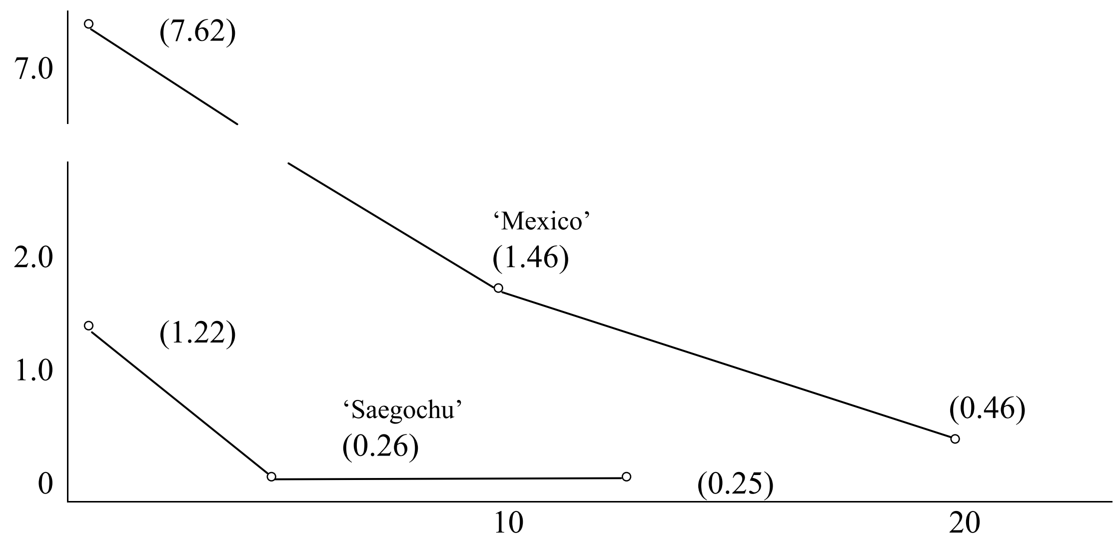
As shown in fig. 1, endogenous ABA level in 'Saegochu' seeds with high germinability at low temperature (10°C) was 1.22 ug/kg D.W. (dried weight), whereas 'Mexico' seeds with low germinability had 7.62 ug/kg D.W. which is 5 times higher than the level of "Saegochu'. The content of 'Daehwacho'with medium germinability was 1.90 ug/kg D.W. This result agreed wth Evenari's work according which inhibitors were found in fruits and leaves of C. annuum. Fig. 2 shows a change of ABA



'Saegouchu' 'Daehwacho' 'Mexico'
Vertical: Endogenous ABA content (ug/kg. DW. Seed)
Fig. 1 Endogenous ABA content in dried pepper seeds as influenced by cultivars.

1/ Rate of 'Saegouchu' (100) to other cultivars.

Level in seeds during germination periods. Time-course level of ABA in seeds changed with cultivars. 'Mexico' which has low germinability shoed that ABA level in seed significantly dropped as seeds germinate. But 'Saegouchu' which has high germinablity showed a little change in ABA level. This result was similar to that obtained with other crops. It is believed that endogenous ABA in pepper seeds is clearly involved in controlling germinability at low temperature.



During after seeding.

Verticle: Engogenous ABA content (ug/kg. D.W. Seed)
Fig. 2 The changes of ABA in germinating seeds of two cultivars which have different germinability at low temperature(10°C)

<u>References</u>

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“BREEDING AND PRODUCTION IN HUNGARY’ I NTERNATIONAL MEETING NAGYSZÉNAS-BUDATÉTÉNY, 7-11 August 1984

S. Gyôrffy
Research Institute for Vegetable Crops, Station Budatétény, Budapest P.O. Pox 95. 1775 Hungary

Hungarian experts of paprika meet yearly with the purpose t o discuss the current problems of breeding and production. The conference is combined with a field show. This time representatives of 12 foreign countries participated the meeting and contributed to the show with their own varieties and hybrids.

The lectures presented at the Center of the Cooperative “October 6.”, Nagyszénás were intended to give a comprehensive picture of the paprika production in Hungary.

“The position of Hungarian pepper production in the World” by A. Somos,
“Pepper production in greenhouses” by J. Lóczi,
“Experimenta1 results of nutriton and fertilization in pepper forcing” by I. Terbe,
“Management and technologies in field grown pepper” by B. Rajki,
“Hungarian pepper varieties in foreign trade” by L. Pone,
“Pepper products of the processing industry for how consumption and for export” by S. Csizmás;
“Resistance breeding in the pepper varieties of ‘Szentes” by M. Pesti

The Paprika group at Budatétény of the Research Institute for Vegetable Crops displayed its current activities in 8 topics:

“Genetic resources in the Capsicum genus” by G. Csilléry was an account on the results of interspecific hybrid production. A challenge for cooperation in 5 defined topics has been launched once more. It is the gene mapping and intense interchange of material/mutants, wild accessions, marked tester stocks etc./ and information which need the must coordination et an international level, with practical application in resistance breeding and hybrid production,
“Using biotechnology in breeding” by M. Fan presented recent achievements in tissue and embryo culture /of Capsicum/.
Virus research for resistance breeding” by I. Töbiás and R. Gáborjányi gave a summary of the activities of the recent 8 years,
“Resistance to the red spider mite in pepper” by Martinovich reported on tolerant lines found in the Hungarian assortment
“Salt tolerance and exocarp thickness of pepper” by Miss I. Fischer described the first steps of screening for salt tolerance as well as further results in differentiating cultivars according to their exocarp-anatomy,
“Selection for the speed of development and for tolerance to poor light conditions” by Mrs. M. Sasvári attempted the analysis of components of earliness one of the most decisive characters in the economy of production,
“The problems of hybrid breeding” by Mrs. A. Moór treated the current status of breeding work concentrated to the improvement of hybrid parents by incorporation of resistance and male sterility.

The leader of the Paprika Group L. Zatykd gave in his paper on

> "Methods, trends and results in pepper breeding" a general account of the recent and expected demands of **t** he consumption and industry, as well as how breeding is able to keep up with competition by profiting of the alternative and ramification possibilities offered by up to date selection theory. Nevertheless there is a need of a well founded policy in creating and releasing of new varieties.

English or Russian texts of the papers have been distributed to the participants, whereas the lectures were held alternatively in the Hungarian, English, German and Russian language. There was possibility to ask questions and to discussion helped by expert-interpreters on the meeting lead by A. Andrásfalvy.

The volume was completed by a geographic map of Hungarian paprika producing areas, statistical data of paprika production, a list of research activities in Hungary, and of breeders involved in registration and maintenance of varieties as well as contributing by research to the current and future results. A list of recent relevant publications, concerning paprika breeding and production closes the hectographed edition.

As the number of specimens was planned originally to meet the need of participants, additional copies have to be node on the cost of eventual applicants for $ U.S. 10-each. Please contact directly S. Györffy ZKI, Budatétény, Budapest pf . 95., H-1775, Telex: 226088 ,Phone 666-853, Private: 264-553

The participants visited in the "Arpád" cooperative at Szentes the protected cultures of paprika, which gave an example of the utilization of geothermal heating and plastic tunnels with some emergency heating systems.

The highlight of "paprika experiences" was undoubtedly the show at Nagyszénàs where in the nursery of the breeders 400 lines here exhibited. Further on the International Show 162 varieties, hybrids and variety candidates grouped into 36 blocks demonstrated how the respective plants are able to grow and yield under Hungarian field conditions. Are not with a topographical guide the interested could find the items listed in the register of accessions, and his own stocks delegated during the last winter. Hungarian growers invited to the conference had the opportunity to consult immediately with the representatives of the exhibiting companies or breeders, respectively. The popularity of the Show suggested that even more turn should have been assigned to this program.

The last day, on a short visit at Budatétény Station of the Res. Inst. of Vegetable Crops, the headquarters of the Paprika breeding group, breeding stocks and a profuse collection of mutants, more than about 200 has been shown. Many thanks to all foreign and Hungarian partners' cooperativeness in sending their own lines for the purpose of completing the list of Capsicum mutants. They are also offered f or international use and volunteers are recruited to help to establish Capsicum cytogenetics and gene mapping on an international level.

ANNOUNCEMENTS

The Institute of Plant Breeding and Seed Production of the University of Turin has organized a Meeting, held in Asti on 28th and 29th September 1984, whose subject was: "Pepper breeding with special regard to the italian situation".

The papers gave were the following:
A. Andrasfalvy (Budapest, Hungary) - Interspecific crosses in Capsicum.
E. Pochard (Montfavet, France) - Resistance to pathogens.
R. Gil Ortega (Zaragoza, Spain) - Problems of the pepper for industrial use.
F. Sàccardo (Roma, Italy)- Mutagenesis: results and aims.
L. Quagliotti (Torino, Italy) - Cultivars and seeds problems.
E Silvetti, C. De Toma (Bologna, Italy) - Influences of morphological traits on yield in pepper.
G. Lepori (Torino, Italy) - News and trials on autopolyploidy in pepper.
P. Belletti, S. Lanteri (Torino, Italy) -Research and storage of pepper seeds as germp1asrf~ in Piedmont.
R. Maini (Mirandola, Italy) - Evaluation of some new pepper cultivars and lines in Italy.
A. Sozzi, A. Testoni (Milano, Italy) - New hot ~peppers: some qualitative indexes.
S. Porcelli, F. Fiume (Salerno, Italy) - Genetic factors for disease resistance in pepper.
G. Cristinzio, F. Saccardo (Napoli and Roma, Italy) - Pepper mutants resistant to Phytophtora capsici induced by gammna-rays.
F. Fiume, G. Interlandi, F. Restaino (Salerno, Italy) - Evaluation of resistance to Verticillium dahliae in lines of Capsicum annuum.
M. Di Vito, F. Saecardo, A. Carella, N. La Gioia (Roma, Italy) - Use of resistant plants of pepper for controlling root - knot nematodes (Meloidogyne spp.).
M. Marte (Perugia, Italy) - Viral diseases and genetic improvement of pepper in Italy.
M. Conti (Torino, Italy) - Recent virological problems of pepper and related investigations on possible sources of resistance.
J. W. Hennart (Torino, Italy) - Osmotic treatment of pepper seeds.
U. Franceschetti, T. Sofi (Torino, Italy) - Effects of gamma-rays on pepper seeds germination.
L. Quagliotti, R. Trucchi (Torino, Italy) - Ageing effect on pepper seeds.
A. Liuzzo (Asti, Italy) - Pepper growing in Asti's area.

The proceedings of the Meeting are available at the Institute of Plant Breeding and Seed Production, via P. Giuria 15, 10126 Torino, Italy.

VI EUCARPIA CAPSICUM & EGGPLANT MEETING

According to the agreements in Sophia, the VI Eucarpia Capsicum & Eggplant Meeting will be held in Zaragoza (Spain),very probably on October 1986.

The organization in the south of our country is not going to be possible because it is difficult to manage from Zaragoza a Meeting to be held 1,000 km away. Anyhow, several Stations in the south of Spain are in disposal to receive an organized visit of the participants who want to travel there in the following days after the Meeting.

We expect to send the first announcement in the coming Spring.

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