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Section of Plant Breeding and Seed Production
Via P. Giuria, 15 – 10126 Turin – Italy

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FOREWORD

That's done! Thanks to the double issue that we published last year, we are now on time with our publications. So, starting from this issue (by the way, have you noticed that "Capsicum Newsletter" is celebrating its decennial?) we are going to do our best to be punctual and to go on publishing the Newsletter by the planned time, the summer of each year.

In this issue, we are happy to show no less than three invited papers. They have been kindly written by S. Daskalov (mutagenesis in pepper), A.A.Cook (pepper breeding for disease resistance) and A.T.B.Rast (resistance to viruses in eggplant). We are sure that all the readers will find them very interesting. In the next issue we hope to be able to publish invited papers on RFLP mapping and male-sterility in pepper. S. Tanksley and G. Csillery have already been contacted and have confirmed their availability to write them. Anyway, we would like to remind you that any suggestions on the subjects and/or authors being considered for the invited papers of the following issues of "Capsicum Newsletter" will be appreciated.

Although several contributions have not been accepted, we have not modified any of the published papers. Therefore the authors 'themselves are not only responsible for the scientific content but also for the form of their own reports.

The survey of 'literature review' is again present in this issue. We hope it will be useful and we would like to remind you to send us a copy of your articles, mainly those published on journals of limited circulation.

Please, remember that a subscription fee to the Newsletter is requested. The subscription fees have not been changed: 20 U.S.$ for normal subscribers and 100 U.S.$ for supporters. Starting from this issue it is

possible to book your own copy of the journal: just fill in the order form on page 75 and send it to us. In the meantime your chosen subscription fee should be paid directly to EUCARPIA Secretariat (please notice that the address has been recently modified). Please, do not send cheques to us in Turin, as we are not allowed to run any financial activity by Italian law.

Again we have to complain about the lack of attention paid by some authors to the instructions on the enclosed sample sheet. Please, cooperate with us and follow these instructions very carefully. Otherwise we will not accept the contributions and they will be sent back to the authors.

Lastly, we have to announce that the, journal's Scientific Committee is going to be modified: Edmond Pochard has now retired and has asked to be released from his engagements with "Capsicum Newsletter". We wish to thank Dr. Pochard very much for his Useful work with us. lie will be replaced by Alain Palloix (who is now in charge of the Pepper Breeding Laboratory at INRA, Montfavet-Avignon) in the Scientific Committee. Welcome and fruitful work with us!

Piero Blelletti, Maria Ornella Nassi, Luclana Quagliotti

Turin, 31st May 1991

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EXPERIMENTAL MUTAGENESIS AND MUTATION BREEDING IN PEPPER

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Experimental mutagenesis at present is an established method for increasing the genetic variability in many crop plants and according to IAEA more than 1,300 mutant varieties have already been released..

In the last 20-25 years a considerable number of mutation studies in pepper were undertaken and a lot of mutants were obtained which were used in plant breeding as well as in genetical, cytological, biochemical, etc. investigations.

Abbreviations

DES = diethyl sulphate

DMS = dimethyl sulphate

El = ethylenimine

EMS = ethyl methansulphonate

NEU = N-ethyl-N-nitroso urea

NMU = N-methyl-N-nitroso urea

Mutation research

Daskalov (1968, 1971, 1972, 1973, 1974, 1977, 1986) has investigated the mutagenic effect of gamma rays, X-rays and EMS and obtained several useful mutants, e.g. male sterile mutants, gene markers, dwarfs, changed fruit form and colour, etc. Terzyan and Sahakyan (1974) have found a dose dependant increase of the frequency of morphological mutations and a different mutability after X-ray irradiation. The mutagenic effect of various chemical mutagenes (EMS, DES, El, NEU, NMU) has been investigated by Kalovkyan (1968), Videnin et al. (1968), Batikian and Galuklan (1971), Solomatin (1973), Videnin aTd Skripnikova (1971, 1972), Skripnikova (1976, 1978), Rajam (1988). Batikian and Galuklan (1971) have obser~ved a significant difference of mutability of the cultivars used and induction of multiple mutations after NEU and NMU treatments. According to Skripnikova (1976) the highest mutation rate was induced by NEU but mutants having valuable characters were observed more frequently after low doses of NEU and DMS. Patil and Meshram (1981) reported a considerable increase for quantitative characters in M generation after treatment with EMS and DMS. Zubrzycki and von der P&en (19712) have compared the efficiency of X-rays' and EMS. EMS proved to be more efficient in the induction of chlorophyll mutations while no difference in the induction of morphological mutations was observed. In another study the same authors

(1973) have obtained data showing that EMS induces higher frequencies than X-rays of both chlorophyll and miorphological mutations. A study of the efficiency of recurrent X-ray t-,eatments with alternating treatments by X-rays and DES has been undertaken by Sethupathi Ramalingam (1977). The obtained data did not indicate any of these treatment procedures to increase the rate of chlorophyll mutations significantly but an alteration of the mutation spectrum was observed. Auni et al. (1978) applyed gamma irradiation to various development stages (dry seeds, germinated seeds, gametophytes, zygotes, 15 and 30 days embryos). The highest rate for both chlorophyll and morphological mutations has been obtained following treatments of either dry seeds or both gametophytes. Saccardo (1983) and Saccardo and Monti (1984) have reported data concerning the gametophyte irradlation technique indicating some advantages, the most important being that the M_1 plants are non-chimeric and seeds for the M 2 generation may be harvested from the whole M_1 plant. But there are some disadvantages, e.g. one additional generation is required and the treatment conditions can not be precisely monitored. Samovol (1987) reported data of changed values of some quantitative characters by treatments of F I hybrid seeds with 1,4 bisdiazoacetylbutane. Sripichitt et al. (1988) used 12 days old seedlings for irradiation and subsequent in vitro culture to regenerate plants. Some M_1 plants showed changed traits, most of which were mantained in M 2.

Mutagenic treatment procedures

For induction of mutations mainly seed treatments have been used. Only in rare cases gametophyte treatment (pollen grains, whole anthers, female gametophyte) has been applyed.

Dose range and treatment conditions used in mutation experiments are shortly summarized:

- dry seeds: 100-400 Gy X-rays (Daskalov, 1968, 1971, Sethupathi Ramalingam, 1977); 60-400 Gy gar.ma rays (Daskalov, 1973, Bansal, 1973, Auni et al., 1978, Todorova and Daskalov, 1979); 2-40 Gy fast neutrons (Bansal, 1973, Saccardo and Sree Ramulu, 1977, Todorova and Daskalov, 1979); 20-24 hrs treatment with 0.2-0.6% EMS (Zubrzycki and von der Pahlen, 1972, 1973, Saccardo et al., 1976, Saccardo and Sree Ramulu, 1977); 3-9 hrs treatment with 1% EMS (Todorova and Daskalov, 1979); 20 hrs treatment with 0.05-0.005% DMS (Rubzov and Solomatin, 1974, Skripnikova, 1976); 20 hrs treatment with 0.02-0.005% El (Rubzov and a, 1976); 20 hrs treatment with 0.05-0.012% Solomatin, '1974, Skr'pn*kovL NEU (Rubzov and Solomatin, 1974, Sckripnikova, 1976); 8-24 hrs treatment with 0.1 NMU (Rajami, 1988); 200-400 Gy X-ray recurrent treatment (Sethupathi Ramali'.ngam, 1977).
- pre-soaked seeds: 18 hrs pre-soaking, 18 hrs treatment with 0.02-0.008% El (Batikian and Galukian, 19710; 18 hrs pre-soaking, 18

hrs treatment with 0.05-0.012% NEU (Batikian and Galukian, 1971); 18 hrs pre-soaking, 18 hrs treatment with 0.012-0.008% NMU (Batikian and Galukian, 1971); 12 hrs pre-soaking, 6 hrs treatment with, 0.3% EMS (Bansal, 1973); 12 hrs pre-soaking, 6 hrs treatment with 0.01-0.03% NMU (Bansal, 1973).

- germinated seeds: 12-20 Gy gamma rays (Auni et al., 1978).
- male gametophyte (pollen or anthers): 5-20 Gy gamma rays.

The M_1 plants usually are raised on isolated plots (approximatively 700 m apart from other pepper plantings) to prevent cross pollination. The use of gene markers is advisable because it would help to detect contamination from cross pollination. At least 3,000-5,000 M I plants must be raised per experiment. It is recomended to harvest the fruits from the main bifurcation or those from each main branch since their seeds segregate more often mutations (Saccardo and Sree Ramulu, 1977, Hermelin et al., 1983). For the purpose of mutation breeding in most cases the M 1 progeny method has been used (Daskalov, 1968, 1972, 1973, Saccardo and Sree Ramulu, 1977, Bansal, 1973, Skripnikova, 1976). Applying this method 20-25 M 2 plants per M 1 plant or 10-15 M plants per M fruit (with 2-3 fruits per M_1 plant) have to be grown. If the desired character is very easily and distinclty recognizable on a single plant basis the M_1 bulk method may be used. In this case, from each M_1 plant 2-3 fruits from the main bifurcation and the main branches should be harvested and up to 15 seeds taken from each fruit to form the M_2 bulk. The size of the M_2 population,according to my experience,that can be handled by one person is approx. 70,000-100,000 plants. The selection of mutants usually is carried out in M generation. Only when monoplold material is being used selection J mutants may start in M 1 generation (Pochard, 1970).

Useful mutant characters

A great number of mutants have been obtained and described as a result of mutation experiments. The gene symbols as well as a short description of the known mutants (spontaneous or induced) are given in the gene list (Lippert et al., 1965, Daskalov, 1973). Csillery (1980, 1983) has described 113 additional spontaneous mutants.

- Male and female sterile mutants

Daskalov (1968, 1973) obtained 5 male sterile mutants after irradiation of dry seeds with X-rays and gamma rays which were denoted as ms-3, ms-4, ms-6, ms-7 and ms-8. The genes ms-3 and ms-8 were used for developing hybrid cultivars (Daskalov, 1976). The ms-3 gene was used for testing a new method for hybrid seeds production (Daskalov, 1973, 1976). Pochard (1970) obtained 3 male sterile mutants after treatment of monoplold material with EMS which were denoted as mr9, mc705 and mc509. The latter was used for establishing hybrids (Breuils and Pochard, 1975). Rubzov and Solomatin (1974) reported male sterile mutants

obtained after treatment of dry seeds with DMS. Daskalov and Mihailov (1983) developped a new method of hybrid seed production based on the use of a female parent combining male sterility with a recessive conditional lethal gene. In F 1 all plants resulting from self-pollination of the female parent die at the cotiledonary stage ensuring 100% purity of the hybrid plantation. Daskalov (unpubl.) obtained two conditional female sterile mutants (cfs) which are characterized by excessive permanent flowering during the whole vegetative period. Daskalov and Mlhallov (1988) proposed the use of the female sterile mutants as pollenizer in the hybrid seed production.

- Disease and pest resistant mutants

Karasz (1974) reported induction of a CMV resistant mutant which was released as cultivar. Saccardo and Sree Ramulu (1974) have screened for resistance to CMV in M 2 progenies after treatment with fast neutrons and EMS and have obtained some plants showing no symptoms. In another experiment the same authors (1977) after fast neutron and gamma irradiation have obtained some plants showing no symptoms to Verticillium dahliae Kleb. Todorova and Daskalov (1979) have investigated the effect of gamma rays, fast neutrons and EMS on inducing resistance to powdery mildew. After screening a large M 2 population 3 resistant plants were established. The progenies of these plants consisted of plants expressing different degrees of resistance. After subsequent selection up to M generation 8 resistant lines were developed. Lakshmi et al. (198T) obtained a leafy calyx mutant which showed some resistant to Spodoptera litura (fruit borer) as the leafy calyx protected the fruit base from penetration.

- Fruit colour mutants

Daskalov (1974) has obtained after treatment of dry seeds with X-rays a mutant with orange mature fruits. Probably a mutation involving the y gene has occured and the interaction of the genes y and cl determines the orange colour. The fruits are characterized by increased beta carotin (provitamin A). A mutant with sulfury white immature colour (gene mutation of the allele series sw) was reported by Daskalov (1974). - Dwarf and compact type mutants

Sethupathi Ramalingam (1977) has induced by gamma irradiation a compact type mutant with determinate growth pattern and a number of desired characters. Daskalov (1973, 1974) described two dwarf mutant denoted as dw and dw-2 which were obtained after gamma irradiation. Skripnikova (1976) described a compact type mutant following NEU treatment. The compact type mutants are suitable for mechanized cultivation and once over harvest. Another possible use of such mutants as well as dwarfs is to serve as a tool in genetic and mutation research (Daskalov, 1981).

- Mutants with changed fruit form

A mutant with short conic fruits was obtained by Daskalov (1972)

after irradiation of dry seeds with X-rays. Rubzov and Solomatin (1974) and Skripnikova (1976) described mutants with conic fruits after treatments with NEU. A tomato form mutant was obtained by Skripnikova (1976) following tretaments with El. Lakshmi and Rao (1988) obtained mutants with short, stout and conical fruits with thick pericarp.

- Gene markers

Easily recognizable gene markers are very useful in hybrid seed production, mutation breeding and genetical investigations. Daskalov (1973, 1974) has induced 3 anthocyaninless (al) mutants after gamma irradiation. The mutant phenotype (lack of blue stain on the hypocotyl, nodes, fruits and anthers) is easily recognizable. Mutants with marbled leaves, yellow cotyledons, light green leaves, etc. were described by Daskalov (1972, 1974).

- Mutants affecting quantitative characters

Videnin et al. (1968, 1971, 1972), Dolgich (1970), Rubzov and Solomatin (1974), Skripnikova (1978), Batiklan et al. (1980) applying chemical mutagens succeeded in inducing higher yielding mutants. Mutants with enlarged fruits were reported by Rubzov and Solomatin (1974), Skripnikova (1976), Batikian et al. (1980). A mutant with increased dry matter content of the fruits was obtained by Skripnikova (1976) after treatment with NEU. Rubzov and Solomatin (1974) have discovered a mutant with thick pericarp and increased weight of the fruits after treatments with NEU. Early ripening mutants were obtained by Videnin et al. (1968), Dolgich (1970), Rubzov and Solomatin (1974), Skripnikova (1976) after treatments with chemical mutagens.

Released mutant cultivars

- 'Horgoska,slatka-X-3' (Karasz, 1974), resistant to CMV.
- 'Albena' (Daskalov, 1975), early and high yielding, more attractive fruits and better flavour.,
- 'Krichimski ran' (Daskalov and Milkova, 1976), very early and high yielding hybrid.
- 'MDU.1' (Sethupahi Ramalingam, 1977), compact plant, type, high yield and capsaicine content.
- 'Lyulin' (Milkova and Daskalov, 1983) very early and high yielding hibrid.
- 'Friari KS80' (Restaino, 1985), increased fruit production, tolerant to Verticillium dahliae Kleb.
- 'Pirin' (Todorova et al., 1991, unpubl.), resistant to powdery mildew.
- 'Orangeva kapia' (Daskalov et al., 1991, unpubl.), high content of beta carotin (Provitamin A).

A more comprehensive review was written by Daskalov (1986).

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PEPPER BREEDING FOR DISEASE RESISTANCE

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Pepper is one of the most popular garden vegetables throughout the world. Many horticultural forms are grown and the crop is cultivated under widely differing environmental conditions. Irrespective of the geographic location and the horticultural form(s) grown, disease(s) constitute a major constraint to successful production everywhere. For many of the major diseases of pepper, there presently are no cultural means for satisfactory field control which leaves genetic resistance as the only realistic alternative. Fortunately, many disease resistance characters have been found within the genus Capsicum, but there remains a continuing challenge to find and utilize still more heritable factors for disease control. A summarization of pepper breeding has been published by Greenleaf (12).

Virus diseases are the most consistent problem for pepper production throughout the world. The importance of virus infection in herbaceous crop plants, including pepper, stems from the fact that there is no remedial procedure for a plant once it has become infected, and the infection can result in loss of all salable produce from that plant. Some of the most troublesome viruses affecting pepper are efficiently transmitted in nature by insects which, themselves, often are difficult to control and thereby reduce virus spread. Further complication is added by the capability for significant pathogenic variation between strains of a given virus, viz. tobacco mosaic.

Response in pepper to tobacco mosaic virus infection was first studied by Holmes (15) and found to be governed by a series of three alleles (16). A fourth allele has now been postulated for this series (1, 25) which is unique in that specific genotypes of infected plants are phenotypically distinguishable. Although tobacco mosaic is not generally transmitted by insects and usually is of little consequence in the field, one biotype of this virus can be seedborne in pepper (19). Viruses commonly grouped together according to biological characteristics and called "potyviruses" are among the most frequent and troublesome problems of pepper world wide. Some of these viruses have distinctive strains that have been distinguished (2, 4) and may serve to complicate development of resistant varieties equally as much as distinct viruses. Resistance to isolates of potato Y, tobacco etch, pepper mottle and pepper veinal mottle viruses have been reported (5, 27, 28, 30) but resistances have not been identified for alfalfa mosaic nor potyviruses from Argentina (11) or Venezuela (10). Although

differences in pathogenicity of specific pathotypes of each virus add significant complication to a breeding program, demonstrated linkage of resistances to potato Y and tobacco etch viruses (3) can be used to advantage. Epidemiological importance of the two potyviruses from South America, i.e. pepper severe mosaic in Argentina and pepper mild mosaic in Venezuela, remains to be determined.

In some locations, viz. Europe, Southeast Asia, cucumber mosaic virus is a major problem in pepper but in other locations it is seen only on occasion. The search for usable resistance to cucumber mosaic is complicated because verifiable infection of candidate plants is not so consistent as with some other viruses, viz. potyviruses, and symptom expression is much more erratic. Partial resistance has been reported (22, 24). Tomato spotted wilt and an unidentified gemini virus have come into prominence in the USA in recent years and may command attention in the future.

Hypersensitive resistance to tobacco mosaic infection is conferred by single, dominant characters in both C. annuum and C. frutescens. Effective but incomplete localization of infection (resistance) is recessive to hypersensitive resistance but dominant to systemic (mottling) susceptibility. The intermediate (resistance) allele must be in the homozygous condition to be effective for disease control. In plants heterozygous for this allele and the recessive (mottling) allele, tobacco mosaic infection induces infection systemic necrosis. All known resistances to potyviruses are conferred by single, recessive alleles when homozygous.

Bacterial leaf spot, caused by Xanthomonas campestris pv vesicatoria, is not generally so pervasive as virus infections in pepper, but, under favorable environmental conditions of warm, wet, windy weather can be quite damaging. Sprays with copper compounds, beneficial if weather is completely favorable, are mostly ineffective under conditions that encourage disease development. Resistance to that form of the bacterium predominant in Florida (USA) in the 1960's was found in an accession of C. annuum (PI 163192)(7). Field testing of breeding lines that included this resistance led to discovery of another biotype of the causal bacterium (8) found later to be the more prevalent biotype worldwide (9). Resistance to this second biotype of the bacterium was found in C. chacoense (6) and transferred into cultivars resembling and compatible with C. annuum. Still a third biotype of the bacterium was distinguished from inoculation of PI 271322 (13) used as a source of resistance to bacterial spot in Hawaii (17). Resistances to all three biotypes of the bacterium are conferred by single, dominant, independent genes (14).

A black spotting disease (29) was observed on fruits of several different cultivars in USA, Hungary, Australia and New Zealand in the 1970's. Presumed resistance to this disease of unknown cause was noted

(personal communication) but heritability was never demonstrated.

Resistance in pepper to Phytophthora capsici has been reported (18, 23, 26) but incidence of the disease has not been sufficient to warrant a concerted effort to develop resistant varieties.

Much of the breeding for disease resistance in pepper has been directed toward control of virus diseases which are the most widespread and damaging problem in this crop irrespective of horticultural type. Each disease must be considered a single entity until information about heritability of resistance has been acquired. Likewise, biotypes of the bacterial spot organism must be considered in the same fashion until heritability of resistance is proven. Only then can a program to combine appropriate resistances be formulated and horticultural characters added. Throughout the entire breeding program, it is necessary to inoculate progenies-plants to recover-verify specific resistances. Field screening for such purpose is an invitation to disaster. Seed increase from plants with multiple resistances must be. performed with extreme care to avoid outcrossing if the continuity of these traits is to be maintained (20, 21).

Creation of pepper cultivars effectively resistant to virus infection and bacterial spot disease is a formidable task but the horticultural needs of the commercial grower and industry must also be considered in a breeding program for it to be completely successful. Incorporation of horticultural characters many of which are multigenic in nature further complicates a breeding program based largely on simply inherited dominant and recessive characters. Breeding peppers horticulturally acceptable with disease resistances effective for a specific location certainly is a challenging task for the researcher who must be capable as a Plant Pathologist and Horticulturist.

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SCREENING GERMPLASM OF SOLANUM MELONGENA FOR RESISTANCE TO THE EGGPLANT **STRAIN OF BELL** PEPPER MOTTLE VIRUS (BPMV) AND OTHER TOBAMOVIRUSES

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Abstract

Germplasm of Solanum melongena, comprising 526 accessions, was screened for resistance to the eggplant strain of bell pepper mottle virus (BPMV), tobacco mosaic virus (TKV), tomato mosaic virus (ToMV) and pathotype P 1.2 of pepper mild mottle virus (PMMV). Resistance based on hypersensitivity was found to TMV, ToMV and PMMV, but not to BPMV.

Introduction

In 1979 a mosaic disease, caused by a tobamovirus, occurred in glasshouse crops of eggplant in the Netherlands. III subsequent investigations (T6bids et al., 1982; Rast, 1985) the tobamovirus appeared almost identical to the unusual pepper strain of tobacco mosaic virus (TMV) described by Feldman and Oremianer (1972). This pepper strain was later classified as a distinct tobamovirus and renamed bell pepper mottle virus (BPMV) so that the tobamovirus isolated from eggplant had to be referred to as the eggplant strain of BPMV (Wetter et al , 1987). Meanwhile the Solanum melongena accessions of the Centre for Plant Breeding and Reproduction Research (CPRO) in Wageningen were tested in vain for resistance to the eggplant strain. The search was thereupon continued to comprise the entire germplasin collection of the U.S. Department of Agriculture. In the tests, performed over a period of five years, the eggplant strain was compared to TMV, tomato mosaic virus (ToMV) and pepper mild mottle virus (PMMV), the latter described by Wetter et al. (1984). The results are reported in this paper,

Materials and methods

The seeds of the S. melongena accessions were routinely soaked in a 100 ppm solution of gibberellic acid (CA3) for 24 hours before sowing. Germinated seedlings were transplanted in three rows of five or six seedlings in potting soil in styropor boxes measuring 60 x 40 x 7 cm. The seedlings were mechanically inoculated when the first true leaf had a diameter of about 2 cm. The inoculum consisted of infective, crude leaf sap or a purified virus suspension with 600 mesh carborundum added as an abrasive and was applied with a plug of cotton-wool. After inoculation excess carborundum was washed off the plants with water. Symptoms were read after 7 and 21 days. In case plants remained symptomless, they were sometimes assayed on Nicotiana glutinosa, a local lesion host for tobamoviruses. The tobamovirus isolates used for inoculation were Al, MA, SPS and P8 representing the eggplant strain of BPMV, TMV, ToMV and the pathotype PI.2 of PMMV respectively. For each accession of S. melongena BPMV was inoculated to 30 - 36 plants, grown in two boxes. TMV, ToMV and PMMV were each used to inoculate one of the three rows of plants, grown together in one box.

Results

In the symptoms observed two main types of reaction could be distinguished. Infected plants reacted either with mosaic symptoms of varying intensity or with necrosis, which remained localized or spread systemically. The severities of the symptoms were suggestive of differences in virulence between the tobamovirus isolates used. For any given S. melongena accession mosaic symptoms were consistently more distinct with BPMV than with TMV or ToMV. The plants inoculated with PMMV mostly remained symptomless. Occasional assays on N. glutinosa indicated that such plants were either systemically infected or were free from virus. Necrotic reactions were also most severe with BPMV and caused death of the plants by a rapidly progressing systemic necrosis. With TMV the plants usually survived a similar systemic necrosis. SPS caused only local necrotic lesions and abscission of the inoculated leaves. Again with P8 the plants, except for rare, tiny necrotic lesions in the inoculated leaves, remained symptomless and no virus could be detected in the non-inoculated top leaves. Of the many symptom readings some were selected as examples of S. melonaena accessions reacting with mosaic symptoms only (Table 1) or with both mosaic and necrotic symptoms (Table 2). The examples given are representative of the 363 and 163 accessions listed under their Plant Introduction numbers in Appendices 1 and 2 respectively. The accessions of which more than half of the plants reacted with necrosis are indicated by an asterisk in Appendix 2.

Discussion

It is obvious that the S. melongena accessions, which largely reacted with mosaic symptoms, were susceptible to infection with the tobamoviruses used. In the other accessions the necrotic symptoms suggest a resistance based on hypersensitivity, which is effective against ToMV and PMMV, less effective against TMV, but ineffective against the eggplant strain of BPMV. However, it should be realized that the lethal systemic necrosis caused by BPMV in our tests resulted from deliberate seedling inoculation and may not occur with random chances for infection of older plants under field conditions. An effort to obtain uniformly resistant lines by selfing plants, which had reacted only, with necrotic, local lesions to BPMV (see P.I. no 381281 in Table 2) failed as there was no substantial increase in the proportion of such plants in their progenies. So, whenever the necessity should arise for breeding resistance to BPMV into S. melongena, another source of resistance should be sought for among related species. From observations at a private breeder's holding it was learnt that in accessions of S. aethiopicum a hypersensitive type of resistance to BPMV does exist.

Acknowledgement

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Table 1. Reaction of Solanum melongena accessions to inoculation with BPMV, TMV, ToMV and PMMV.

P.I. nos	PBMV	N.O. Plants	TMV	N.o. plants	ToMV	N.o. Plants	PMMV	N.o. plants
164757	Lc/SM	30	Lc/SM	6	Lc/SM	5	-/s	5
171855	Lc/SM	36	Lc/SM*	6	Lc/SM*	6	-/-	6
188816	-/Sm	36	-/Sm*	6	-/Sm*	6	-/-	6
320505	-/Sm*	36	-/Sm*	6	-/Sm*	6	-/s	6
419000	-/Sm	36	-/Sm*	6	-/Sm*	6	-/-	6
411917	Lc/SM	36	Lc/SM	6	Lc/SM	6	-/s	6

Symbols used for discription of symptoms on inoculated leaves/symptoms from systemic infection: c = chlorosis, L = local lesion reaction, M = clear mosaic, m = mild mosaic, m* = very mild mosaic or mottling, n = necrosis, n! = letah necrosis, S = systemic reaction, s = latent infection, - = no symptoms

Table 2. Reaction of Solanum melongena accessions to the eggplant strain of BPMV, TMV, ToMV and PMMV.

P.I. nos	PBMV	N.O. Plants	TMV	N.o. plants	ToMV	N.o. Plants	PMMV	N.o. plants
140460	-/Sm*	1	Ln/-	2	Ln/-	5	-/-	5
	Ln/Sn!	29	Ln/Sn	3				
179498	Lc/Sm	23	=/Sm*	3	-/Sm*	3	-/s	2
	Ln/Sn	4	Ln/Sn	2	Ln/-	2	-/-	3
	Ln/Sn!	3						
181897	Lc/Sm	22	-/Sm*	3	-/Sm*	2	-/-	6
	Ln/Sn	4	Ln/Sn	2	Ln/-	4		
	Ln/Sn!	10	Ln/Sn!	1				
381182	-/Sm	11	Ln/-	5	Ln/-	6	-/-	4
	Ln/Sn	15	Ln/Sn	1			Ln/-	2
	Ln/Sn!	11						
381281	-/Sm	1	Ln/-	5	Ln/-	5	Ln/-	6
	Ln/-	5	Ln/Sn	1	Ln/Sn!	1		
	Ln/Sn	30						
320506	Ln/SM	32	-/Sm	5	-/Sm*	4	-/-	5
	Ln/Sn!	4	Ln/Sn	1	Ln/-	2	Ln/-	1

For symbols see Table 1.

Appendix 1. List of Plant Introduction nos of Solanum melongena accessions reacting largely with mosaic symptoms to BPMV, TMV and ToMV

102727	164288	169665	176759	200856	286100358243
105346	164293	169666	176762	200881	286101358244
115507	164294	169667	176764	204731	286103358245
115508	164305	171847	177073	206472	286104362727
115509	164321	171848	177074	206993	286105368821
115511	164358	171849	177075	207517	286107368822
116063	164359	171850	177545	212040	288629368823
116064	164458	171851	179045	213025	288631370046
116536	164462	171852	179046	213026	288633370049
116677	164483	171855	179048	213027	290468370050
120798	164661	173104	179494	214177	290469370051
121359	164710	173105	179495	220120	291374370601
140448	164721	173106	179496	222268	292269371849
140451	164757	173107	179497	222833	302805379541
140452	164811	173109	179499	222834	302811379542
140453	164812	173110	179500	223016	302812379543
140455	165505	173807	179659	223844	304839379544
140456	165519	173967	179744	226529	304840379545
140457	166994	174360	179760	227254	304841381159
140459	167373	174361	179761	229543	320501381160
141968	167381	174362	180000	229730	320503381161
141969	199640	174364	180001	230333	320505381162
141970	169643	174367	180342	230334	320507381166
143402	169647	174368	180343	230335	321017381169
143404	169648	174369	180344	232078	321018381170
143405	169649	174370	180345	232079	323322381171
143407	169650	174374	180346	249569	323324381172
143408	169651	174375	180347	249570	349612381173
143411	169652	175909	181806	249571	350320381174
155511	169653	175910	181807	256077	351129381175
163264	169654	175911	181895	257419	352678381176
163265	169655	175912	181896	268428	358233381177
163267	169656	175913	181962	269653	358234381178
163268	169657	175914	181963	269662	358235381179
163270	169658	175915	182300	269663	358237381186
163271	169659	175916	183356	271411	358238381188
163272	169660	175917	183476	271412	358239381189
164277	169661	175918	188816	271520	358240381190
164283	169662	176756	193599	276103	358241381192
164286	169664	176757	198331	286099	358242381196

Appendix 1 (continued)

381213	381248	381286	386270	413781	419117452124
381214	381254	381287	386272	414372	419118470273
381215	381255	381288	386273	418975	419119476415
381219	381262	386008	386275	418976	419120478388
381222	381268	386251	391645	418977	419157478389
381223	381270	386253	391646	419000	419159478390
381224	381272	386254	391647	419001	419161478391
381225	381274	386255	391648	419002	419198478392
381227	381275	386258	391649	419003	430664491192
381229	381276	386261	408973	419020	436679508502
381236	381282	386266	408974	419035	436680508503
381247	381285	386268	408975	419054	452122

Appendix 2. List of Plant Introduction nos of.Solanum melongena accessions reacting partly with mosaic, partly with necrotic symptoms to BPMV, TMV and ToMV

105347	164813	169663	182996	223534	269659302809
115505	164941	171853	183718	224690	269660302810
115506*	165059	173108	198330	228363	276104320500
115964	165579	173111*	198332	233016	277287320502
116061	166995	173968	199516	234632*	277288320504
120770	166996	174359	204630	241594	277289320506
121992	167077	174365	210026	24016	279872320508*
140446	167101	174372	211631	246932	279873320509
140447	167208	176758	212627*	249568	279874320510*
140460	167209	176763	213191	251506	279875320511*
143403	167220	177076	213193*	256078	286102*320512
143409	167328	179498	213194*	263727	286106323323
143410	169639	179998	217962	267104	286108350318
163266	169641	181897	220685	267116	288634350319*
163269	169642	181921	222267	269600*	290467352677*
164529	169644	182296	223015	269601	291033352679*
164581	169645	182994	223017	269655	302807358232
164672	169646	182995	223018	269656*	302808370047

Appendix 2 (continued)

381180	381237	381284	386262	386271	413783*491260
381181	381242	386252	386263	386274	413784*
381182*	381243	386256	386264	391644	419158
381187	381277*	386257	386265	401533	419160
381191*	381281*	386259	386267	401717*	452123*
381232	381283*	386260*	386269	413782*	462370

*) S. melonzena accessions in which more than half of the plants reacted with necrotic symptoms.

Capsicum Newsletter, 10 (1991), 33-34.

Capsicum ACCESSIONS OF THE POLYTECHNICAL UNIVERSITY GENEBANK OF VALENCIA

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The establishment of the Project "collection, Multiplication and Evaluation of the Genetic Resources for their conservation of Genebank", subsidized by the National Institute of Agricultural Reasearch (INIA) in 1988, allowed our team to continue the task of collecting, characterization and multiplication of vegetable germplasm initiated in 1982 (Nuez et al., 1985, 1987).

Besides the collection carried out in the Iberian Peninsula, it is necessary to empasize the work done at eh Canary Island. These Islands acted during the colonization period as a bridge for the exchange of materials between Europe and Latin America and also at present follow playing this role. Still today it is possible to find there material of interest.

Table 1 showes the accessions of Capsicum collected in each community. The classification proposed by Pochard has been followed to set up every accession according to their morphological characteristics.

In group A are included the American type peppers. 'Yolo Wonder' is a representative variety of this group. Most part of the accessions are enclosed in B and C groups. A typic variety of B is 'Trompa de Vaca' and in this group are comprised the "moron" peppers. Nearly all the accessions collected in Canary Islands has been included in Group C, peppers not so big and fleshy like the ones belonging to group B and longer and thinner. In these Islands it is very important the cultivtion of pungent peppers, utilized as flavouring in one typical dish Island, the "mojo picon". Group N and P are less important. Group N is made up of "Noras" type, decoration peppers cultivated in pots and "pungent cherries". The eight accessions of P group are all used for processing.

The sampling that constitutes these 384 accessions collected in Spain, reveals the diversity of types in materials locally adapted exisiting currently, in spite of the fact that most part of the consumption of peppers proiceed from commercial varities. It is necessary to show up the coincidence between the characteristics of the accessions collected (75% of them belongs to Group B and C) and the preferences of the Spanish market: a type of pepper long and with thin flesh (Group C) and more fleshy and thick (Group B). The 36 accessions belonging to Group A probably come from commercial hybrids introduced some years ago in Almeria area for their intensive cultivation, since this type of pepper is not the typic in our country.

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Table 1 – Accessions collected

C O M M U N I T I E S								
	Andalucia	Canary Islands	Castillia La Mancha	Extremadua	Murcia	Valencia	Others	TOTAL
A	17	--	--	2	4	9	4	36
B	16	3	7	10	6	22	15	79
C	24/22	44/31	4/9	16/3	7/3	11/18	9/19	115/105
N	9/3	2/1	1/-	5/2	3/-	9/4	1/1	30/11
P	2	--	3	--	2	1	--	8
TOTAL	68/26	49/32	15/9	33/5	22/3	52/22	29/20	268/116

No Puntent/Pungent
Group A: Quadrangular longitudinal section, as long as wide. Thick flesh.
Group B: Quadrangular longitudinal section, more long than wide. Thick flesh.
Group C: Tirangular longitudinal section. Long pepper with thin flesh.
Group N: Spherical fruit (Nora type).
Group P: Heartshaped fruit (for processing).

Capsicum Newsletter, 10 (1991), 35-36.

CITOGENETICAL STUDY IN INTER-VARIETAL GRUSSES OF CAPSICUM ANNUUM L.

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85 single as well as reciprocal crosses were made in Capsicum annuum L.('Pusa Jwala'x'California Wonder' in order to combine some desirable characters from these two distinct genotypes.

In both the cultivars, all PMC's studied,recorded 12 bivalents atdiakinesis and M1. Their chair, configuration occurred more commonly in cv 'Pusa Jwala', FI hybrid and P1.2, P1.3 and P1.4 in F2 generation (Table I). Univalents were not observed in parents but were invariably found in F1 and F2 plants. The chiasma. Frequency chromosome was lower in cv 'Pusa Jwala', FI hybrid and all 4 F2 generation plants,in comparison to the cv 'California Wonder'. Unlilke parents, the moiosis was fairly irregular in both FI and F2 plants. The common meiotic abnormalities occurred were unorientation of chromosome(s), chromosome bridge, unequal separation of chromosome(s) and different types of sporads. FI hybrid differed significantely from both parents in total meiotic abnormalities % as well as pollen, viability %. Because of hiph rate of flower abscission and very poor pollen viability in FI h.ybrid, only one fruit could be obtained whereas all four F2 plants remained fruitless mainly due to blackening of young flower buds followed by T00%, bscission. Weak F1 hybrials have been reported by Kumar et al. (1987) from the crosses between Capsicum cbinense x C. frutescens whereas Nwanliiti (1981) obtained fertile FI ybrid'sfroal a cross between var. 'OS/UN/60'x'Tatasi' of chilli, but by using artificial pollination techniques. He attributed the lack of self-fertility to the pattern of arrangements of reproductive organs.

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Table 1.
Chromosome configuration in parents and their hybrids.

Type	Configurations			Chaisma frequency/ Chromosome
	I	OII	CII	
Cv 'California Wonder'	0.0	6.02 (2-12)	6.01 (0-10)	0.75 (0.58-1.00)
Cv 'Pusa Jwala'	0.0	4.0 (3-7)	8.0 (5-7)	0.66 (0.58-0.70)
FI hybrid	2.02 (0.4)	4.97 (3-8)	6.01 (3-8)	0.66 (0.58-0.79)
F2 generation:				
PI.1	13.57 (12-16)	2.62 (2-16)	2.58 (2-4)	0.325* (0.29-0.41)
P1.2	2.87 (0.4)	3.44 (1-5)	7.25 (5-9)	0.58* (0.50-0.66)
PI.3	4.00 (2-6)	2.94 (2-6)	7.05 (4-8)	0.538* (0.50-0.66)
PI.4	0.51 (0-2)	4.25 (2-6)	6.84 (6-9)	0.63 (0.54-0.75)

* Significant at 1% level.

A CASE OF CHROMOSOME NUMERICAL MOSAICISM IN C. ANNUUM VARIETY ‘JAWAHARI.

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The existence of two or more than two different chromosome numbers in the meiocytes of the same anther is termed as chromosome numerical mosaicism. This is an infrequent cytological abnormality encountered both in root tips and anther cells. This phenomenon may arise either spontaneously or be induced through physical and chemical treatments.

A mosaic with different chromosome numbersof 2n = 24, 26 and 28 was encountered while making the cytological scrutiny of open pollinated tetraploids of C. annuum variety 'Jawahart Phenotypically this plant was quite distinct having more spread and light green foliage. However, there was decrease in leaf length, breadth and thickness. There was no appreciable difference in the size of the flowers.

Detailed meiotic analysis of the plant revealed three types of chromosome numbers. Of the 136 cells analysed at diakinesis, 4 cells showed the chromosome number of 24 (mean chiasma frequency of 17.75 $\pm$ 0.41 per cell), 33 cells 26 (mean chiasma frequency of 20.18 $\pm$ 0.19 per cell) and 99 cells 28 (mean frequency of 17.54 $\pm$ 0.16, per cell) -Chromosome distribution at anaphase I was regular in 76.92% of cells while lagging chromosomes and bridges were observed in 23.08% of the cells. Telophase II abnormalities like micronuclei and polyads were encountered in higher percentage, in cells showing 2n = 28 number (72.19%) followed by 2n = 26 (24.26%) and 2n = 24 numbers (2.95%). In addition to the normal bivalents, univalents, trivalents and quadrivalents were observed in low frequency.

Pollen fertility was very low being 6.43%. The plant was highly sterile. Only three fruits could be secured on open pollination.

The chromosome mosaicism encountered in the present study may be attributed to the effect of colchicine which might have affected both the spindle and normal physiological processes in the plant causing cellular effects.

Table 1. Variation in chromosome number and chiasma frequency in the mosaic of C. annuum var. 'Jawahar'.

S.No.	Chromosome number	Percentage	Chiasma frequency per cell + SE
1.	2n = 24	2.95	17.75 + 0.41
2.	2n = 26	24.26	20.18 + 0.19
3.	2n = 28	72.79	17.54 + 0.16

Capsicum Newsletter, 10 (1991), D-40.

A CASE OF PARTIAL ASYNAPSIS AND FRAGMENTATION IN AN AUTOTETRAPLOID CHILLI.

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In 'Jawahar', a local cultivar of C.annuum in C_3 generation of autotetraploids, in addition to the normal tetraploids, a tetraploid exhibiting failure of pachytene pairing for some chromosomes along with fragmentation was encountered. Hence this is described as a partial asynaptic tetraploid.

The asynaptic tetraploid was different from the normal tetraploid in having stunted growth and flower buds of irregular size and shape. The Plant was completely sterile and fruit set was totally absent.

Detailed meiolic analysisof the asynaptic tetraploid revealed that there was a significant decrease in the frequency of quadrivalents and bivalents"With concommiL'ant increase in the frequency of univalents both at diakinesis (37.20 ± 0.69) and metaphase 1 (36.52 ± 0.51), when compared to the normal autoteraploid (0.13 ± 0.09 at diakinesis, 0.24 ± 0.13 at metaphase I) (Table I). In autotetraploid, anaphase I segregation was regular in 75.21% of the cells while in the asynaptic tetraploid, the univalents were randomly distributed throughout the cytoplasm. The remarkable increase in the number of univalents at diakinesis (30-44 per cell) and metaPhase 1 (30-42 per cell) which -far exceeded the other associations suggeste(q the asynaptic condition. The mean chiasma frequency per cell was significantly less (7.24 ± 0.42 at diakinesis and 7.00 ± 0.44 at metaphase I) than that obser-, Ted in normal autotetraplold (Table I). Another interesting feature was the occu-rence of small innumerable fragments in the asynaptic tetraploid in 32% of cells. The high frequency of univalents and fragments lead to highly irregular meiosis resulting in complete sterility of the plant.

Asynapsis has been attributed to a variety of causes such as abnormal external conditions, chromosomal deficiencies, genetic combinations and other biochemical and physiological conditions. Since the plant was completely sterile it was not possible to assess the cause of asynapsis correctly. However, since all the tetraploid plants are grown under uniform agroclimatic conditions, the cause is inferred as genetic.

Table 1. Chiasma frequency and chromosome association in normal and asyaptic autotetraploids of C. annuum var. 'Jawahar'.

Tetraploid	Stage	No. of cells	Mean frequency of univalents	Mean frequency of bivalents	Mean frequency of quadrivalents	Chiasma frequency per cell
Normal autotetraploid	Diakinesis	50	0.13 ± 0.09	19.47 ± 0.35	2.23 ± 0.17	34.87 ± 0.29
	Metaphase I	50	0.24 ± 0.13	18.76 ± 0.37	2.56 ± 0.17	35.32 ± 0.30
Asynaptic tetraplooid	Diakinesis	50	37.20 ± 0.69	3.00 ± 0.34	1.00 ± 0.14	7.24 ± 0.42
	Metaphase I	50	36.52 ± 0.51	2.66 ± 0.33	1.04 ± 0.13	7.00 ± 0.44

Capsicum Newsletter, 10 (1991), 41-42.

A NEW METTIOD OF ESTIMATING THE NUMBER OF LOcnEs IN PEPPER

(C. annuum L.)

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Fruit uniformity in pepper (C. annuum L.) at optimum environmental conditions depends mainly on the number of locules. For "Cal. Wonder" type pepper fruits with /I locules, are preferred, but for "Kapiall t,ype pepper fruits with 2 locules are favoured. The number of locules is usually counted at the stage of technological- or botanical fruit maturity.

In pepper, however, the number of fruits is a small- part in comparison to the large number of all formed reproductive organs. Therefore, -this estimating method based on counting only the number of locules of the fruit is imperfect. The locules are formed at a very early stage of' organogenesis (Loskutova et' al., 1988). Because of this, the aim of the investigation was to estimat~ the number of locules in all formed buds and to compare the results with the traditional method i.e. estimating the number of locules in fruits.

Material and methods

In greenhouse (1988-89) and in the field (1989) at the Institute of Genetics - BAS, the number of locules in varieties 11PT-25" ("Cal.Wonder" type), "PT-3611 (tomato type) and PT-169 ,"Kapial'~ type) from Greek Gene Bank and"'Zlaten medal" (Bulgarian "Kapiall type) as control, were counted.

From each variet 'y 3 plants were grown in 6 replications. In 3 replications the number of locules in buds was counted and in the other 3 the number of locules in botanical maturity fruits. From each variety 18 plants were grown in greenhouse and 18 plants in the field. The total number of plants evaluated in the trials was 14.4-

By the new method once a week all formed buds and flowers are picked and cross - sectioned and by the aid of a magnifying lens the number of locules were counted. The total number of counts was 341 for fruits and 4124 for buds.

Results and discussion

The results are given in table 1. From table we see that in "Cal. Wonder" type ("PT-25") the number of locules was estimated in 927 buds and 58 fruits. Observation shows that the buds are with 2, 3 and 4 locules.

The fruits in greenhouse are with 2 and 3 and in field with 3 and 4 locules only.

In tomato type ("PT-3611) 1118 buds and 67 fruits were studied. The results from buds and fruits are similar.

In "Kapiall type ("PT-16911 and "Zlaten medal") 933 and 135, 1146 and 81 buds and fruits were studied, respectively. The buds give us more detailed information in comparison to the number of locules of fruits.

The estimating of the number of locules in the early stage, in all formed buds gives us the possibility to reach the following conclusions:

1. By the new method we estimate 6 - 12 times more reproductive organs and that gives us almost full information about the number of locules in pepper varieties.
2. Both methods give us similar information but throught bud counts information is more detailed.

Table 1. Number of locules in buds and fruits.

No.	Vareity and type	Place of cultivation	Object of estimating	% of buds and fruits with:			Total number
				2 loc.	3 loc.	4 loc.	
1.	"PT-25" "Cal.Wond"	Greenhouse field	Buds	8	66	26	604
			Fruts	31	69	-	32
			Buds	11	45	44	323
			Fruits	-	85	15	26
2.	"PT-36" Tomato	Greenhouse field	Buds	22	70	8	741
			Fruts	32	54	14	37
			Buds	10	36	27	377
			Fruits	10	57	33	30
3.	"PT-169"	Greenhouse field	Buds	93	7	-	526
			Fruts	100	-	-	66
			Buds	80	20	-	347
			Fruits	81	19	-	69
4.	"Zaten medal"	Greenhouse field	Buds	77	22	1	799
			Fruts	95	5	-	39
			Buds	57	41	2	347
			Fruits	67	33	-	42

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Capsicum Newsletter, 10 (1991), 43-44.

RESPONSE OF TWO CHILLI PEPPER (Capsicum frutescens) VARIETIES TO INTRA-ROW SPACING AND NITROGEN LEVELS

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A preliminary trial was conducted at Samaru, Nigeria during 1990 wet season to study the response of two chilli pepper varieties to three intra-row spacings (50,40 and 30 cm) and four nitrogen levels (0,60,120 and 180kq N/ha). I-) split plot denign wRo aMpted with three replications.

The results showed that there was no significant difference in the performance of the two varieties with respect to the parameters analysis. Reducing intra-row spacing from 50cm to 40cm significantly ducroasud plant. height, fruit number and fruit diameter whereas total yield/ha was conversely, inarrasud. However, with the exception of fruit number, there was no significant response in those parameters when the spacing was further rnduced to MUM. All parameters wpre significantly increased with nitrogen application. Leof number was significantly increased with eaEh additional nitrogen level up to 130 kg/he. Other parameturs wore not significantly affected by the application of 180kg N/ha when compared with 1200-N/ha. The two levels however, significantly increased branch number, fruit dlamMer, fruit number and total yield when compared with 60kg N/ha. Thu difference between 60 and 120kg N/ha was not significant with respect to plant height (Table 1).

Table 1. Response of chilli pepper (Capsicum frutesens) varieties to intra-row spacing and nitrogen levels at Samaru, during 1990 wet season.

Treatment	Plant Height (cm) (9WAT):	Leaf number (9WAT)	Branch number (9WAT)	Fruit number (15WAT)	Fruit diameter (mm) (15WAT)	Fresh fruit yield (kg/ha)
Varieties						
UL 2289	34.83	251.31	41.56	148.33	8.70	2143.34
PL 2289	36.42	273.45	43.52	157.12	8.91	2251.18
SE ±	1.124	15.655	1.859	6.215	0.149	76.250
Intra-row Spacing (cm)						
50	38.31a	166.34a	35.69	50.11a	9.11a	2032.61b
40	36.25b	160.14ab	34.14	179.93a	8.43b	2942.98b
30	35.51b	159.17b	34.00	108.35c	8.00b	2953.12a
SE ±	1.450	3.420	1.360	15.367	.560	36.517
Nitrogen (kg/ha)						
0	30.21c	150.00d	26.00c	106.61c	7.45c	563.30c
60	46.51b	165.30c	29.45c	222.58c	8.13b	1658.38b
120	50.63ab	185.48b	31.32a	263.44a	8.89a	2747.41a
180	54.12a	206.31a	32.67a	220.00a	8.23a	2253.31a
SE ±	2.00	4.031	.450	26.789	.576	56.865

Means a column of any set of treatment within each parameter, followed by unlike letter(s) are significantly different at 5% significance lvelel lusing DMRT.

: WAT = Weeks after transplanting.

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COLOR EVALUATION OF SELECTED CAPSICUM

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Plant breeding and selection of pepper cultivars Capsicum annuum L. for paprika and oleoresin has been carried out at CRIA. Along the selection process, several varieties of dark red colour with chlorophjll retainers genes and conventional red colour have been obtained (Costa et al., 1989).

The presence of chlorophyll in ripe fruits of some dark red cultivars modifies the colour ratings determined by eye. LL16 in 1970 indicated that varieties with higher chlorophyll compounds in their fruits have also more carotenoids pigments.

To evaluate grounded and dehidrated paprika fruits, visual colour rating in normaly used. This method is very common in factory but it is not very accurate.

Useful colour parameters for the industry have been obtained by light reflexion using the spectrophotometer Hitachi V-3200.

Figure I shows the comparison of colour spectra from conventional' red (a and b) and dark red pepper varieties with chlorophyll retainers genes (c and d). At 670 nm wavelenght, a valley is formed due to the presence of chlorophyll.

Figure 2 has been drawn with the CIE coordenates of reflected colour; from it we can see that all varieties with chlorophyll retainers genes (PP.19, PP.34, PO.12 and PO.2) are located on the left and by the opposite conventional red cultivars are on the right.

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Capsicum Newsletter, 10 (1991), 47-48.

RELATIONSHIPS BETWEEN SOME CHARACTERS IN CHILLI PEPPER (Capsicum frutescens)

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Knowledge of the association between chAracters is very useful in breeding programmes. Characters such as yield are quantitative in nature and are often strongly related to other characters. For this reason, knowledge of the relationship between yield and other characters is very important for effective yield improvement.

Results of a correlation study for characters of two chilli pepper varieties indicated that there was a positive and highly significant relationship between fruit yield
and fr"it number, plant height, leaf number, and branch number. The correlation between fruit number and plant height, leaf number and branch number was also positive and highly significant. Fruit diameter was positively correlated with plant height, leaf and branch number. Days to 50% flowering were negatively correlated with other characters. Similarly, there was a negative correlation between fruit length and fruit diameter. The correlation between days to 50% flowering and fruit yield, fruit number and leaf number was significant.

Table 1:Simple correlation coefficients between some characters in chilli pepper.

Characters	Fruit yield	Fruit number	Fruit dianeter	Fruit length	Plant height	Leaf number	Branch number	Days to 50% flowering
Fruit yield	1.00							
Fruit number	0.975::	1.00						
Fruit diameter	0.143NS	0.614::	1.00					
Fruit length	0.244NS	0.11INS	–0.016NS	1.00				
Plant height	0.816::	0.791::	0.4111	0.392NS	1.00			
Leaf number	0.893::	0.516::	0.513t	0.4191	0.359NS	1.00		
Branch number	0.7411:	0.548::	0.4821	0.38INS	0.366NS	0.423:	1.00	
Days to 50% Flowering	-0.415t:	-0.451:	-0.05INS	-0.132NS	-0.314NS	-0.482t	-0.243NS	1.00

It = Highly significant t = Significant NS = Not significant

Capsicum Newsletter, 10 (1991), 49.

A. NEW RESISTANT SWEET PEPPER VARIETY

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A new sweet pepper variety ('Liliana SC 81') was obtained by selection at "Liliana Dmitrova" Horticultural Institute. The plants of this new variety reach a height of 50 – 60 cm and a diameter of 50 cm; they have 4 or 5 primary branches. The leaves are dark green. Flowering begins 45 – 50 days after transplanting and 5-7 days later fruit setting takes place. At maturity fruits are dark green turning dark red later. These fruits are 7-10 cm long; 3 cm in diamter and 3 mm in pericarps thicknes; usually they have 2 locales.
There are 18-20 fruits per plant with 10 g mean fruit weight.
Seventy per cent of the fruits can ripe at the same time: for this reason only 4-5 harvestings are necessary, so it lets to extend this variety to greater areas in our conditions.
At 110 days after sowing begins harvesting. The vegetative cycle in 160-170 days.
In Cuba the fruits are used fresh for cooking because they are sweet and very aroumatic, its flavourir is similar to 'Chay': a traditional variety used for the same purpose.
Sowing can be made all the year round. Yeilds are 18 t/ha average. The seed is sown at a density of 50 000 – 60 000 plants/he.
It is resistant to TMV (Pat 0); PVY (Pat 0) and CMV. As awll as Xanthomones carpestris pv. Vesicatoria.

Capsicum Newsletter, 10 (1991), 50.

WAFER - A NEW VARIETY FOR PROTECTED GROWING AND OPEN FIELD PRODUCTION INTUNISIA

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A new variety 'Wafer' was developed at the Experimental Station of Manouba (SAM) through crosses breeding between three varieties 'Anaheim', 'SM 477', and 'LP1'.

This variety is easy to harvest including the genes ep (easy picking) and up (straight fruit).

The plants are about 90 - 100 cm tall with strong stem and 2 - 3 main branches.

The fruits are green, smooth, weighing 25 - 30 g, glossy, 12 - 15 cm long, 2 - 3 cm wide, with 2 locules, 3.8 - 4.0 rmm-n thickness of pericarp, 16.2 Z dry matter and the acidity experessed as citric acid is 1.55 - 1.60 %. The fruits are characterised by good transportability and possibilities for long storage.

The variety 'Wafer' is suitable for protected growing and open field production especially for Harissa" which is a hot past.

Capsicum Newsletter, 10 0"1), 51-52.

HETEROSIS) IrAl F HYDRIDS OF HOT PEPPER (CAPSICUM ANNUUM L.)

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Six parental lines /B0-2, PA-5, Cp-4, Hi-3, FG-1 and L-36/ and thirty F I hybrids of hot popper, obtained from a complete diallel crossing, were tested at the same time in two environments: in open field conditions and under plastic cover. This re.)ort presents the results on heterosis effects /calculated in relation to the superior parental form/, for seven characters significantly correlated with yield /K'ordus, 1991/. The follotiing features oere considered: 1. total yield of fruits/plant, 2. yield of physiologically mature /red/ fruits/plont, 3. total number of fruits/plant, 4. number of physiologically mature fruits/plant, 5. mean fruit weight, 6. number of days from sowing to the beginning of flowering, 7. number of days from soviing to the beginning of ripening.

Generally, the studied F 1 hybrids showed higher heterosis effects in field conditions. That suggested bettor adaptability of the F I hybrids to loss favourable environment for popper growing.

The heterosis effects over 50% were only observed in the field experiment for the F I hybrids coming from ctosses between low yielding lines. Heterosis in yield of some F I hybrids was a result of higher fruits number per plant, primarily. The highest heterosis, effects %,,jere noted in the yield and number of physiologically mature fruits, especially in the field experiment. Heterosis for the remaining studied features was rather low.

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Table : Analysis of heterosis effects in F_1 hybrids of hot pepper

Character	Environment	Percentage of heterosis							Number of heterosis hybrids
		20,0	40,0	60,0	80,0	100,0	120,0		
1	Field Under plastic	2 6	2 3	3 -	- -	1 -	- -	1 -	9 9
2	Field Under plastic	3 9	5 3	6 2	3 -	2 -	- -	1 -	20 14
3	Field Under plastic	5 5	3 3	1 -	- -	- -	- -	- -	9 8
4	Field Under plastic	9 10	7 2	4 1	1 -	- -	- -	- -	21 13
5	Field Under plastic	11 1	1 -	- -	- -	- -	- -	- -	12 1
6	Field Under plastic	14 7	- -	- -	- -	- -	- -	- -	14 7
7	Field Under plastic	9 8	- -	- -	- -	- -	- -	- -	9 8

Capsicum Newsletter, 10 (1991), 53-54.

INTERVARIETAL CROSSING OF 32LI, ANU HOT PEPPER AUGMENTS THE HYBRID SEED YIELD

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Hybrids are now so widely used in agriculture that everyone wants to grow hybrids for commercial cultivation inspite of high seed costs. Joshi (1986) reported, that heterosis breeding in Capsicum is feasible due to its low sced rate per hectare besides, quality attribu-1Ces improved through favourable dominant gene combinations. Hybrid seed production through conventional methods of artificial emasculation and pollination is very costly affair in spice paprikas. Exploitation of heterosis in this group has been hampered as hybrid seed, production is not economical as only few seeds are pruduced in each pollination and non-availability ddesirable genetic male sterile line or chemically induced sterililly. Therefore, the studies were undertaken to cope up the high seed costs and to find out the possibilities of economical hybrid seed production by crossing two intervarietal divergent groups of Capsicum annuum L. var. grossum (bell) and var. fasciculatum (hot pepper). These combinations were made for exploring the dominant traits of male hot pepper parents ~GB'and 235') viz., pointed blossom end and pungency and more number of seeds per fruit (200-300) of the female parents CM11and'02). Adopting this technique the number of hybrid seeds per pollination is increased to 298 and 204 in bell pepper than 64 and 110 seeds in hot, pepper (table 1), Both -the hybrid s'CVI'xGB' and 'OZ x'235' exhibited heterotic effect for all the characters studied against male parent, except for number of fruits per plant vfiich is intermediate. Both hybrids gave 324.6 and 45.6y. Higher yields respectively over male parent, with superior fruit quality, deep crimson red coloured berries desired for spice paprika. Heterosis foi yield mainly resulted from the combined heterosis for plant height, fruit size and number of fruits per plant. Thomas and Peter (1988) also reported similar results in their heterosis studies.

Table 1: Mean performance of parent s and hybids.

Variety	No. of seeds/fruit	Plant height (cm)	Fruit size (cm)		No. of fruits/plant	Ripe fruit yield/plant (kg)	Flesh thickness (mm)
			Length	Diameter			
Bell pepper (o+)							
'California Wonder' (CW)	298.2	85.0	5.8	6.4	15.9	0.398	>3
'EC 203602'(02)	204.7	78.7	4.4	7.6	17.1	0.938	>4
Hot pepper (o->)							
'KT-Pl-17' (GB)	64.5	98.7	3.7	0.6	102.0	0.150	<1
'LCA-235' (235)	117.7	84.0	7.3	0.9	129.5	0.532	<1
F1 hybrids							
'CW' x 'GB'	-	106.7 (9.2)	8.6 (132.4)	1.9 (216.6)	73.7 (-27.7)	0.637	>1
'02' x '235'	-	90.0 (7.1)	7.7 (5.4)	2.4 (166.6)	67.7 (-47.7)	0.775 (45.6)	<2
'F' value	-	9.42	12.12	116.11	14.46	30.31	-
C.D. at 5%		10.07	1.67	0.82	35.89	0.15	
C.D. at 1%			2.31	1.14	49.71	0.21	

Heterosis percentage over male parent in the parenthesis.

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Capsicum Newsletter, 10 (1991), 55-56.

STUDY OF INTERSPECIFIC HYBRIDIZATION BETWEEN CAPSICUM CHACOENSE AND C. ANNUUM CV. 'POZNANSKA SLODKA' WITH USE OF INSONSYMATIC ANALYSIS.

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The paper presents the study of electrophoretic phenotypes observed in interspecific cross Capsicum chacoense x C. annuum cv. 'Pozananska Slodka'. The electrophoretic method used in the study was described previously by Andrezejeski R.P. et al. (1990).
The four enzyme systems glutamate oxaloacetate transaminase (GOT), phosphoglucomuase (PGM), isocitrate dehydrogenase (IDH) and shikimate dehydrogenase (SKDH) were studied in six generations of Capsicum plants. Figure 1 presents observed electrophoretic variants found in the parental plants, in the hybrids F1 and their backcrosses and also in F2 generation C. charoense x C. annuum cv. 'Poznanksa Slodka'.
The paper presents also mean values of six metric characters for interspecific cross: fruit weight, fruit length, fruit width, plant height, number of the fruits per plant and yield per plant (tabl 1).

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Andrzejewaki R.P., Odrzykoshi I.J., Andrzejewska E., 1990.
Monitoring interspecific hybridizatio between Capsicum baccatu, c. chacoense and C. annuum with isoensymes, Capsicum Newsletter, 8-9, 38-39.

Fig. 1 Electrophoretic phenotypes of 4 marker enzymes in interspecific cross between Capsicum chacoense x C. annuum cv. 'Poznanksa Slodka'

Isoenzyme	C P1	A P2	(C X A) F1	(C X A)XC B1	(C X A)XA B2	C X A F2
GOT	-	-	-	-	- -	- -
			-	-	- -	- -
			-	- -		-
			-			- -
			-	-	- -	
			-	- -		
PGM	-		-		-	- -
	-		-			-
			-	-		
IDH		-		-	- -	
			-		- -	- -
			-	-	- -	-
		-	-	-		- -
		-	-		- -	
SKDH	-		-	- -	- -	- -
					-	- -
						- -

C – Capcisum chacoense
A – Capsicum annuum cv. 'Poznanska Slodka'

Table 1. Morphological characteristics of six generations of interspecific cross between Capsicum chacoense x C. annuum cv. 'Poznaksa Slodka'

Character	N =	C P1 5	A P2 5	C X A F1 15	(C X A)XC B1 25	(C X A)XA B2 25	C X A F2 25
Fruit weight (g)	(g)	0.3	41.1	0.7	0.2	2.3	1.3
Fruit length (cm)	(cm)	1.2	10.7	2.3	1.1	3.3	3.2
Fruit width (cm)	(cm)	0.6	4.3	0.8	0.5	1.3	1.0
no. of fruits/plant		39.3	16.2	70.6	48.4	63.3	47.7
Yield/plant (g)	(g)	7.7	1067.5	25.9	6.8	72.7	30.2
Plant height(cm)	(cm)	47.7	61.3	66.5	71.0	111.7	71.6

Capsicum Newsletter, 10 (1991), 57-58.

EVALUATION OF GENETIC PARAMETERS OF SELECTED TRAITS IN INTERSPECIFIC HYBRIDIZATION BETWEEN CAPSICUM CHACOENSE AND C. BACCATUM WITH C. ANNUUM CV. 'POZNANSKA SLODKA'.

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The paper contains partial results of the experiment concerning the way of inheritance of some traits in the three interspecific crosses between Capsicum chacoense x C. annuum cv. 'Poznanska Slodka', C. baccatum x C. annuum cv. 'Poznanska Slodka' and C. annuum cv. 'Poznanska Slokda' x C. annuum cv. 'Posnanska Slodka' x C. baccatum.

The action of the genes in six generations (P1, P2, F1, F2, B1 (F1 x P1), B2(F1 x F2) of three interspecific crosses of Capsicum was studied by estimation of six genetic parameters (m, d, h, I, j, l) after Mather and Jinks (1982).

The value of estimates for three metric traits : mass fruits, length fruits, width fruits in interspecific cross are given in the table. The results proved the important role of epistasis in the control of these traits.

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Evaluation of genetic parameters and their standard deviations.

Interspecific cross			
Parameters	C.a. x C.b.	C.b. x C.a.	C.cv. x C.a.
Mass fruits			
M	10.33 * 6.49	130.9 * 5.14 +	20.72 * 2.06 +
[h]	-18.53 * 1.58 +	-18.53 * 1.58 +	-20.38 * 1.55 +
[I]	7.731 * 5.62	-15.62 * 13.24	-57.84 * 5.64 +
[j]	-30.72 * 4.74 +	23.28 * 4.62 +	36.58 * 3.19 +
[l]	-8.26 * 9.38	13.96 * 8.29	37.80 * 3.62 +
Length fruits			
M	3.79 * 1.77 +	6.45 * 1.36 +	9.61 * 1.67 +
[d]	2.46 * 0.19 +	-2.16 * 0.19 +	-4.76 * 0.16 +
[h]	10.06 * 4.41 +	0.16 * 3.42	-18.50 * 3.68 +
[I]	4.46 * 1.76 +	1.80 * 1.35	-3.66 * 1.67 +
[j]	-2.65 * 1.21 +	2.79 * 0.98 +	5.13 * 0.73 +
[j]	-4.80 * 2.72	2.33 * 2.13	11.13 * 2.05 +
Width fruits			
M	1.48 * 0.62 +	2.10 * 0.66 +	2.80 * 0.37 +
[d]	1.50 * 0.09 +	-1.50 * 0.09 +	-1.84 * 0.08 +
[h]	2.90 * 1.14 +	0.24 * 1.90	-5.19 * 0.83 +
[I]	1.28 * 0.61 +	0.66 * 0.65	-0.38 * 0.36 +
[j]	-2.47 * 0.34 +	1.29 * 0.46 +	2.09 * 0.24 +
[l]	-2.35 * 0.82 +	-0.31 * 2.16	3.15 * 0.50 +

+ significant at 5% level

[d] – additive action of genes
[h] – domination action of genes
non allelic interaction
[I] – homozygote x homozygote
[j] – homozygote x heterozygote
[l] – heterozzygote x heterozygote

C.a. – Capsicum annuum cv. ‘Poznanska Slodka’
C.b. – Capsicum baccatum
C.ch – Capscicum chacoense

Capsicum Newsletter, 10 (1991), 59-60.

IN VIITRO SHOOT TIP, COTYLEDON'S AND FIRST LEAF CULTURES OF PEPPER (CAPSICUTM, ANINUUM L.)

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Some media that are able to stimulate the organogenesis of Capsicum are shown.

These results depend on genetic factors and culture conditions (exocenous and endogenous factors) as is reported in the literature. For these reasons the study was concentrated on four different cultivars and three explants.

Cultivar: 'Rosso d'Asti'; 'Tondo liscio'; 'Corno di toro rosso o uiallo'; 'Verde piccolo persoftaceto.

Explant:Shoot tip; Base section of cotyledon after emergence; First leaf.

The main medium utilized was:

Macroelements: Murashigc-Skoog (1965); Microelements: Nitsh-Nitsh (1969); FeEDTA 0,025 g/l; Thiamine HCL 0,04 g/l; S(Ar-rose 20 g/l; Algar 6 g/l.

The hormonal concentrations (ppm) and combinations of the media were:

1) 2ip: 0,5 - I and 5; 2) Kin: 0,5 - 1 and 5;
3) BAP: 0,5 - I and 5; 4) IAA: 1 and 5;
5) BAP 5 + IAA 1; BA21 5 + IAA 5; 6) Control

The growing conditions were as follow: temperature 24°C ±1; photoperiod: 16 hours of light.

The tablel indicate that the cultivars behaved differently and the organogenesis is strongly stimulated by hormonal mixtures.

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Table 1

Media	Test	2ip	2ip	2ip	Kin	Kin	Kin	BAP	BAP	BAP	IAA	IAA	BAP 5+	BAP 5+
Explant		0,5	1	5	0,5	1	5	0,5	1	5	1	5	IAA 1	IAA 5
Cv. 'ROSSO D'ASTI'														
Shoot tip	R	C	C	C	C	C	C	C	C	C	R	C	C	C
	-	-	-	-	-	-	R	-	-	-	-	R	B	R
	-	-	-	-	-	-	-	-	-	-	-	-	-	B
First leaf	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	-	-	-	-	-	-	B	-	-	-	R	-	B	B
Bises section of cotyledon	-	-	-	C	C	C	C	C	C	C	-	C	C	C
	-	-	-	-	-	-	-	-	-	-	-	-	B	B
Cv. 'TONDO LISCIO'														
Shoot tip	-	-	-	-	C	C	C	C	C	C	-	-	-	-
	-	-	-	-	-	-	-	-	B	B	-	-	-	-
First leaf	-	-	-	-	-	-	-	-	C	C	-	-	-	-
	-	-	-	-	-	-	-	-	-	B	-	-	-	-
Bises section of cotyledon	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cv. 'CORNO DI TORO ROSSO O GIALLO'														
Shoot tip	C	C	C	C	C	C	C	C	C	C	-	C	C	C
	R	-	R	R	-	-	-	-	R	B	-	R	B	B
	-	-	-	-	-	-	-	-	B	-	-	-	-	-
First leaf	-	-	-	-	-	-	-	-	C	C	-	-	C	C
	-	-	-	-	-	-	-	-	B	B	-	-	B	B
Bises section of cotyledon	-	-	-	-	-	-	-	-	C	-	-	-	C	C
	-	-	-	-	-	-	-	-	-	-	-	-	B	B
Cv. 'VERDE PICCOLO PER SCOTTALGTO'														
	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Shoot tip	R	-	R	R	-	-	-	R	-	B	-	R	B	B
	B	-	-	-	-	-	-	-	-	-	-	-	-	-
First leaf	-	-	-	-	C	-	-	C	C	C	C	R	C	C
	-	-	-	-	-	-	-	-	-	-	R	-	B	-
Bises section of cotyledon	-	-	-	-	-	C	-	-	C	C	R	C	C	C
	-	-	-	-	-	-	-	-	-	B	-	-	-	-

R = Roots; B = Buds, C = Callus.

Capsicum Newsletter, 10 (1991), 61.

BREEDING PEPPER (CAPSICUM ANNUUM L.) FOR RESISTANCE TO PHYTOPHTHORA CAPSICI LEONIAN IN ARGENTINA: 'CALAFYUCO INTA', A NEW CULTIVAR.

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About 13,000 has of pepper are yearly grown in Argentina. Bell type peppers are grown f o r fresh market and heart-shaped-peppers ("Calahorra") for processing.

The soilborne disease caused by Phytophthora capsici Leonian (P.c.) is one of the most serious factors that limits pepper crop in our country, specially in irrigated zones.

At La Consulta Experiment Station, a breeding program has been conducted to introduce resistance against local strains of P.c. in both, bell and hearttype peppers. As result of the program, the resistant bell-type pepper'Fyuco INTAlwas released (Galuarini, H. and Senetiner, A., 1986). Since that time our aim has been to obtain a resistant "Calahorra" type pepper.

A sexican hot pepper, the accesion line'493-4-1-2'fron Dr. P. Smith of the U.C. Davis, was used as initial source of resistance;'Perfection'and'Calatauco INTAI '(a heart- shaped cultivar resistant to TMV) was used as recurrent parents in a backcross program.

In order to test P.c. resistance, an adaptation of the Pochard-Chambonnet (1972) proposed methodology was used: In young-potted plants with 8 to 10 leaves, the fourth leaf was removed. The stem surface was inoculated with a 4 an diameter disk of P.c. mycelial culture. The plants were then covered with plastics bags for 48 hours. Susceptible plants died and resistant material grew normally. Field trials in infected soils were carried out for several years.

The resistant lines were selected for agronomic conditions and regional trials were displayed.

Several lines showed resistance to P.c., 'Calatauco INTA' and 'California wonderlplants used as controls were susceptible. From the resistant lines, we developed a new cultivar: ICALAFYUCO INTA' this variety has a heart-shaped fruit, with dark-red coloration at maturity; thick walls and an average weight of 130 S. In f ield trials, I CALAFYUCO INTAI yielded 25, 000 Kg/ha; It has good quality for processing and dehydration, and it combines resistance against both P.c. and TMV.

We are doing regional trials at different production areas of Argentina, in order to prove this new cultivar.

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Capsicum Newsletter, 10 (1991), 62-63.

INFLUENCE OF SEED POSITION IN FRUIT ON SEED VIABILITY AND VIGOUR DURING AMBIENT STORAGE OF CHILLI (Capsicum annuum L.) FRUITS

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High seed quality comprising high viability and vigour is prerequisite for successful stablishment of seedlings in ficle as well as for high crop production. Seed viability is predominantly dependent on nature age of seeds (HarrinLton and Satyati-Haraeig 1966) and method of storage. The present experinient via.s conducted with the to stud, ' effects of position of seed in fruit or viability and viour during amfbient storage of chilli fruits.

Materials and Methods

Fruits of chilli cv.'Arka Lohit' were stored in cloth bags and glass container at ambient conditions (16-35°C, 25-90%RH). Thc moisture content of fruit and seed were 9.7 and 8.3 per cent respectively during storage. See viability was tested after 18 months of storage. Fruit was divided into three portions: base, middle and tip. Seeds were removed sepaaaarately and germinated on top of paper at an alternate temperature of 20-30°C for 16-3 hours respectively in Clelands seed germinator. Seed viability was expressed in percentage of germination and seedling vigour in terms of coeffient of velocity of emergence, crop growth rate and vigour indices I and II, which were calculated by multiplying percentage of germination with seedling length and dry weight respetively.

Results and Discussion

Seed viability was significcntly affected by the position in fruit. Seedc from basal region exhibited hiCh 's-erminability over middle and tip portion in fruit, stored both in cloth and ~,,lass containers (Fig. 1). Emergence of seedlings was also earlier in seeds of basal region. Similarly the coefficient of velocity of emergence, virour indices and crop r)rowth rate were g-reater for seeds of basal. ref.,ion of the fruit (Table 1). Viability and vigour of seeds were compara Lively greater for seeds of middle portion. While seeds of tip region exhibited lun viability and vigour. It might be owing to inadequate; supply of nutrients. Hence not suitable for storage. Therefore it is advzantatrcours to reserve seeds, from basal to middle portion of the fruit for retaining high viability and vigour for longer period.

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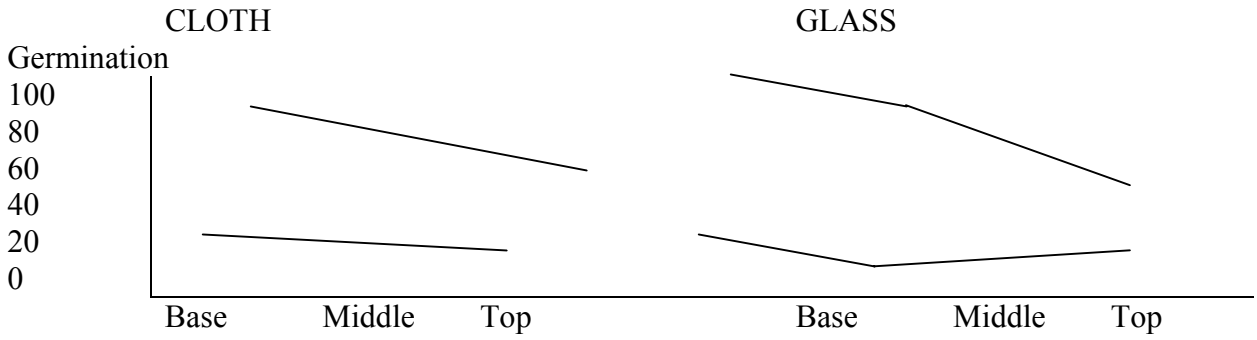

Fig. 1 Percentage of seed germination after 6th (----) and 14th (----) days of sowing in chilli seeds extracted from different portion of the fruit.

Table 1. Seedling vigour of chilli seeds as influenced by the position in chilli

Storage Containers	Portion of the fruit	Coeff. of emergence	Vigour indices		Crop growth rate	
			I	II	Seedling length (cm)	Dry wt (mg)
Cloth	Base	13.9	425	277	0.56	0.23
	Middle	13.0	417	264	0.62	0.21
	Tip	11.4	260	185	0.30	0.17
Glass	Base	14.3	462	329	0.59	0.23
	Middle	12.1	443	289	0.61	0.21
	Tip	10.2	170	117	0.27	0.19
LSD 5%		1.7	189	101	0.14	NS

Capsicum Newsletter, 10 (1991), 64.

RESULTS OF SEED TESTS. X. OCCURRENCE OF FUSAPTUM OXYSPORUM SCHLECITT. ON STORED SEEDS 0F CAPSTCICLUM ANNUUM L.

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134 seed-saples of Capsicum annuum L. reserved in the Hungarian gene bank were tested during the routine germination tests in 1988. The tested seeds were stored at 0/4°C for 6 years before the germination, and 12 samples were selected out with Fusarium oxysporum Schlecht. contamination. The fungus caused pinkish mould on the infected seeds and brownish discoloration WaS- also observed. The infected. seeds were rotted and the germination was often retarted at the surrounding ones, too. The fungus was succesfully isolated from the seed-surface and was cultured on potato dextrose agar /PDA/ and 2% malt extract agar /MEA/ media.

The isolates were fast growing, reaching 4,8-5,6 cm diameters on PDA and MEA. The aerial mycelium was raLher abundant, and its colar was whitish to peach with a purplish tinge. This purplish coloration was more intensive at the stromatic agar surface. Among of conidia-type micro-conidia were developed abundantly in the aerial mycelium, while the macro-conidia were borning at the agar surface. Chlamyclospores were also developed, especially in tile stroma. These chlamydospores were formed terminally or intercalary in hyphae.

Fusarium oxysporum Schlecht. is a world-wide distributed soil-inhabiTing fungus /Domsch et al., 1980/, and can cause wilts on numerous hosts, too /Booth, 1971/. Its seed-transmission is well known on different plants /Neergaard, 1979/ even on chillies /e.g. Ridulescu and Negru, 1971/. The seed-transmission of F. oxysporum has an epideiniolgical role, too /Gambogi, 1983/. However some pathogenic fungi were reported to survive the storage /Hewett, 1987/, to the author)s best knowledge this is the first report on occurrence of the F.oxysporum on long term stored seeds of Capsicum annuum.

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Capsicum Newsletter, 10 (1991), 65.

RESULTS OF SEED TESTS. XI. - SFFD AND SEEDLING ROT OF CAPSICUM ANNUUM L. CAUSED BY TIPTCHOTECTUM ROSEUM /PERS./ LINK EX GRAY

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Trichotecium roseum /Pers./ Link ex Cray was observed as pink mould on rotted seeds and seedlings of Capsicum annuum L. The fungus contaminated tao seed sariiples of 115 tested during the seed health tests in the Hungarian gene bank. T. roseum was isolated from the diseased seeds and seedlings and was identified from pure cultures according to Domsch et all. /1980/. Its pathogenicity on germinatinr% seeds was also investigated.

The cultures of T. roseum were pink and powdery from conidia. The conidiophores were erect. to 1,5-2 mm long, bearing at the tip in zig-zag chains. The conidia were 2-celled, 12,4-24 x 7,8-11,6 micrometers, and were developed abundantly in cultures grown on both potato dextrose agar /PDA/ and 21A,91 malt extract apar /MFA/ media.

The pathogenicity of the funCuo was investigated on artificially infected seeds. The seeds were surface sterilized by 70,06' ethanole solution and then they were soaked in conidium-suspension of T. roseum. The conidia were washed from cultures grown on PDA and the conidium-suspention was adjusted to low conidium/ml. The seeds were treated with this suspension for ten minutes and were germinated on blotter under sterile conditions.

T. roseum caused a stronrr inhibition of seeds were germinated in while the untreated ones were in 14-16%. The germination of seeds vlas also blocked in case of untreated ones placing in ring around the treated seeds. This effect may be caused by toxins of T. roseum, which were tested on different plants le.g. Desai and Siddaramaiah, 1980; Domsch, 1963/.

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Capsicum Newsletter, 10 (1991), 66.

RESULTS OF SEED TFSQTS. XIII. - SOME PATHOGENIC FUNGI OCCURRING OR SEEDS OF EGGPLANT

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In course of routine seed health tests 4 seed samples of eggplant /Lolanum melonpena/ were tested for pathogenic fungi. The seeds were germinated withou-IL-1 surface sterilization or moisted blotter in 1 10 cm diam. Pet ri-dishes, placing 50-50 seeds per dishes and using two replicates. The developing sporulation of fungi was used for identification of fungi and the known seed-pathogens /Neergaard, 1979/ were studied in pure cultures, too. These pure cultures were also used for pathogenicity tests. The pathogenicity of the fungi was investigated by infecting seeds artificially and sowing the in-fected seeds into hoat-sterilized perlite. The infection of seeds was carried out by soaking th surface sterilized seeds in conidium-suspcnsions containing low conidium/ml.

Alternaria alternata and Fusarium oxysporum were the predominants among known seed-pathoCens. Sporadical occurrence of Alternaria solani, Lusarium pallidoroseum and F. Poae was also registered. These fungi would infect the seeds in pathogenicity tests, too. The main symptoms were the blocking of the emergence and rotting the seeds in perlite, but rotting of emerged seedlings was also observed. The fungi could cause root and/or hypocotyl rot on seedlings. The pathogenicity of Alternaria alternata, Alternaria solani and Fusarium oxysporum Wa,3 registered on plants grown on field, too.

Alternaria alternata and A. solani infected the leaves causing spots on them. A. solani could also infect the stem s, especially at the base of leaves and long lesions were formed by the fungus. Fusarium oxysporum caused vascular wilt and root rot on the field, and symptoms on aerial part of plants caused by this fungus were not observed. However these fungi are well known from seeds of different plants /Neergaard, 19.79/ even from eggplant seeds /RAdulescu and Negru, 1971/, this is the first report on their occurrence on seeds of Solanum melongena in the Hungarian gene bank seed-stocks.

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VIIIth Meeting on Genetics and Breeding of Capsicum and Eggplant
ENEA Casaccia Center, Rome (Italy), September 7-10, 1992

FIRST ANNOUNCEMENT

As decided at the V11th Meeting in Kragujevac (Yugoslavia) , the next Meeting will be held in Italy and will be organized by:
- Institute of Agronomy, University of Naples;
- Institute of Plant Breeding and Seed Production, University of Turin;
- National Committee for Research and Development of Nuclear and Alternative Energy (ENEA), Rome.

Participants - All researchers involved or interested in Genetics and Breeding of Capsicum and Eggplant are invited to participate and to present the results of their scientific work.
Language - The official language of the Meeting will be English: no translation facilities are planned.
Lodging - Hotel accomodations will be available both in Rome and in Bracciano. More information will be given in the 2nd circular.
-Variety demonstration - During the Meeting, the participants will have the opportunity of showing Capsicum and Eggplant varieties or lines. The plants will be cultivated in a field in Tarquinia (Viterbo). Those who are interested in using this facility, are kindly requested to send the seeds before **March 10, 1992** to: Mr. P. Papalini, E.R.S.A.L., Centro di Dimostrazione Agraria, Loc. Portaccia, Strada Litoranea km 1,800, 01016 Tarquinia (Viterbo), Italy, tel. 0039-766-88778.
Excursions - During the Meeting a "field day" will be organized to visit demonstration fields and pepper growers as well as archeological sites in the surroundings of Rome.
Proceedings - It is purpose of the Organizers to print a special issue of "Capsicum Newsletter" with the Proceedings of the Meeting. It will be printed in time to be given to the participants during the Meeting.
Second announcement - A second circular with further details of the scientific and social programme will be sent in January 1992 to all those who have shown interest by filling in and returning the enclosed registration form before **November 30, 1991** to:

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