

Symposium 25 (S25): Special Topics in Fruit, Vegetable, and Cross-Commodity Horticulture

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Location: Metro Toronto Convention Centre, Halls B and C

1340–1440

S25–P–1

BIOLOGICAL CONTROL FOR THE MANAGEMENT OF HORTICULTURAL CROP PESTS: COLONIZATION OF *COTESIA FLAVIPES* CAMERON (HYM.: BRACHONIDAE) AGAINST *CHILO PARTELLUS* SWINHOE (LEP.: CRAMBIDAE) IN ZANZIBAR ISLANDS

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Cotesia flavipes, a biological control agent of the stemborer *Chilo partellus* was released in cocoon stage on Unguja and Pemba islands of Zanzibar in May 2000. Two hundred and fifty cocoons were released once in each of 16 sites selected on Unguja and 12 sites on Pemba. To determine its colonization, maize plants with stemborer symptoms were randomly sampled in the field, excised and dissected to remove larvae and pupae. *C. flavipes* was first recovered two weeks after release and was the most predominant parasitoid throughout the season. It parasitized all the three stemborer species present in these sites. However, it was recovered in significant numbers from the target pest *C. partellus*. Recoveries were made in 25 of 28 sites, indicating that colonization of stemborers by *C. flavipes* occurred in these areas. It was responsible for 6.3% and 16.1% of larval parasitism on Unguja and Pemba, respectively. Parasitism by indigenous parasitoids was too low to suppress the pest population below economic damage levels. *C. flavipes* was recovered in at least 8 sites one year after release, confirming that it has firmly established on the islands. A monitoring programme to determine its dispersal and spread on the islands is now recommended.

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THE CONTINUOUS APPLICATION OF THREE TYPES OF HERBICIDES INFLUENCE ON THE SPECIES COMPOSITION OF EMERGENCE OF SPRING WEEDS IN THE ORCHARD

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It is considered weeding effects are changed by continuous application of herbicides. Though, there are few researches to applied same herbicides to same field for many years. We applied the three types of herbicides, diquat-paraquat, glufosinate ammonium and glyphosate isopropylamine to the orchard fields respectively, two or three times a year for ten years consecutively, and the effect of the herbicide application on seasonal variation in emergence of spring weeds, that orchard fields, was investigated. In the fields where weeding was practiced by intertillage, the species composition of emergence of spring weeds were decreased to *Taraxacum officinale* Weber, *Capsella bursa-pastoris* Medicus, *Poa annua* L., *Lamium amplexicaule* L., *Erigeron philadelphicus* L. and *Stellaria alsine* Grimm var. *nudulata* Ohwi. In the Diquat-paraquat herbicide treated fields, on the other hand, spring weeds decreased to five varieties *Rumex japonicus* Houtt., *Taraxacum officinale* Weber, *Solidago altissima* L., *Erigeron philadelphicus* L. and *Calystegia japonica* Choisy after the continuous herbicide application for the ten-year period. In the Glufosinate ammonium herbicide treated fields, spring weeds was decreased to two varieties *Taraxacum officinale* Weber and *Solidago altissima* L., also in the Glyphosate isopropylamine herbicide treated fields, it's decreased to only *Taraxacum*

officinale Weber. In the herbicide treated fields, grass weeds disappeared after the continuous herbicide application for the ten-year period. For the spring weeds, we assume the pattern might have been induced by such factors: the characteristics of the herbicide used and substantial time needed for the weeds to regenerate their plant bodies.

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BOTANICAL CONTROL OF THE DIAMONDBACK MOTH PEST OF CABBAGE USING NEEM SEED EXTRACTS

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Larvae of the diamondback moth (*Plutella xylostella*, Lepidoptera) cause severe damage by feeding on the leaves of cabbage resulting in significant yield losses. It is normally controlled by several synthetic pesticide applications. We tested the extracts from the neem seed (*Azadirachta indica* A. Juss) against the diamondback moth (DBM) at the experimental field station of the Agriculture and Agri-Food Canada, Quebec, as an alternative to synthetic pesticide uses. A neem-based formulation (PronateX PX4) containing 6250 ppm of azadirachtin was used at the dosages of 100 and 200 ppm and compared with cypermethrin during the cropping season of 2001. Six applications for each dose were performed and compared to five applications of the traditional pesticide (Cymbush 400E). The application of the neem extract at 200 ppm was effective as the use of the chemical insecticide in reducing DBM larval population and damage. Generally, the yield was higher in the treated plots compared to the control (1030 vs. 725 g/cabbage heart). The results indicate that the neem extract can be used as an alternative to the traditional chemical control due to its efficacy and its minimal impact on the environment and natural enemies.

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CODLING MOTH CONTROL (*CYDIA POMONELLA* L.) USING FRIENDLY PESTICIDES

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So far, the population of *Cydia* (Carpocapsa) *pomonella* L. has considerably increased, as a result of the biological reserve rise from one year to another. That has been caused due to various reasons such as: none phytosanitary applications at the right timing, uncorrelation between the application schedule and the damage economic threshold (DET), utilization of a lower efficacy insecticides or other products which have already induced a pest resistance. To prevent this resistance of *Cydia pomonella* L. populations towards some insecticides, to lower the toxic residues in fruit but at the same time to expand the commercial offer for the fruit grower, studies on the biological efficacy of the products based on *bacillus thuringiensis* var. *kurstaki* teflubenzuron, triflumuron, fenoxycarb, were carried out. The experiment included the following apple cultivars: Golden Delicious, Starkrimson and Florina. To final out the optimum timing for applications, pheromone traps like Atrapom have been employed and the sprays were done only when the DET has been outrun namely 5 butterflies per trap, per week. The results recorded with those products applied to control *Cydia pomonella* L., have enabled to estimating them as a certain alternative to the pest chemical control. The product values will be enhanced having in view they are harmless to human beings, environment and the useful entomofauna and do not maintain their toxic residues in fruit.

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EFFECT OF RAPESEED OIL ETHOXYLATES ON RAINFASTNESS OF SYSTEMIC, LOCO-SYSTEMIC AND NON-SYSTEMIC ACTIVE INGREDIENTS

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The effect of a homologous series of biodegradable rapeseed oil derivatives (triglyceridethoxylates) with an average of 5, 10, 30 and 60 EO on rainfastness of the systemic herbicidal compound glyphosate, the loco-systemic fungicide prochloraz and the contact-fungicidal substance tolylfluanid on plant leaf surfaces was investigated using *Phaseolus vulgaris* L., *Lactuca sativa* L. and *Setaria viridis* L. plants. After being applied with a hand sprayer until run off, the active ingredient/surfactant solutions were allowed to dry on the leaf surfaces for 2 or 6 h, before they were exposed to 25 mm of artificial rain within a period of 6.5 h. Glyphosate rainfastness was assessed in a bioassay approach by measuring chlorophyll fluorescence (Fm) of *P. vulgaris* and *S. viridis* leaves 24, 48 and 72 h after application of the various glyphosate solutions. In summary, all glyphosate spray solutions reduced Fm significantly 72 h after treatment compared to untreated but irrigated control plants. With decreasing surfactant EO chain length the reduction of Fm was enhanced to a level comparable to that induced by the commercial product Roundup Ultra™. Prochloraz residues on *L. sativa* and tolylfluanid remainders on *P. vulgaris* were rinsed off the leaves with organic solvents and determined gas chromatographically. Only about 70% of the applied non-formulated tolylfluanid and less than 6% of solely applied prochloraz were recovered on the leaf surfaces after the rain event. When using the commercial formulations of Euparen Multi WG and Sportak 40 the rainfastness of the active ingredients was reduced to about 30% (tolylfluanid) and to less than 1% (prochloraz) of the applied doses. In all experiments, lipophilic surfactants provided a better rainfastness than hydrophilic ones. In combination with prochloraz the most lipophilic surfactant RSO 5 enhanced rainfastness of the active ingredient whereas it reduced tenacity of tolylfluanid on the leaf surface. The present results elucidate the necessity for improvements in rainfastness of foliar applied compounds.

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EFFECT OF FLAT AND RAISED BEDS, IRRIGATION AND VARIETIES ON YIELD AND QUALITY IN ONIONS

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Environmental and cultural management factors may increase the susceptibility of onions to pathogens. In Michigan, onions are normally direct seeded on flat beds on organic soils. Onion fields often are flooded for periods of time after heavy rains. A preliminary study in 2000 showed that plant stand was reduced and yield was lower on flat than on raised beds after a period of flooding. Raised beds may improve drainage and aeration around the root zone, resulting in improved plant stand and onion quality. In this study we compared onion grown on flat and raised beds, with or without irrigation, to determine the effect of these factors on yield, quality, and disease incidence. Hoopla, Spartan Supreme, and T-439 cultivars were direct seeded on an 80% organic matter Houghton muck soil at the MSU Muck Research Station on May 3, 2001. Each bed had 3 rows 41 cm apart with 53 seeds per meter of row. May and June were very wet. Beginning on July 5, water was applied to irrigated plots by overhead sprinkler. We evaluated plant stand, fungal infection, yield, and bulb storability. Raised beds had a 31% greater stand than flat beds on average. Hoopla had significantly fewer plants per meter of row, than Spartan Supreme and T-439. Onion on flat beds had greater incidence of *Alternaria porri* than on raised beds. Onions were placed in storage for later evaluation of quality and disease incidence.

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DORMANCY OF BULB ONIONS CONTROLLED BY GROWING TECHNIQUE

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The sprout inhibiting chemical maleic hydrazide used in bulb onion (*Allium cepa*) production may be banded by governmental and European Union restrictions in the near future. Conventional onion growers therefore seek for new methods to achieve a longer natural resistance to sprouting in their onions for long-term storage. A series of experiments from 1997 to 2001 were initiated to find alternatives in growing techniques that could reduce sprouting in on-

ions for long-term storage. The results from five years of experiments show that minimised sprouting in onions for long-term storage can be achieved by use of certain low-sprouting varieties (Summit, Trafford, Wembley), early harvest (at 20–50% top fall-over), use of transplants in groups (alternative to direct sowing), and low storage temperature (0 to 1 °C). Onions produced by this technique will sprout slower after removal from cold storage (about half the speed of normal grown in shelf-life tests at 15 °C). The early harvest will reduce the yield of onions (up to 15%) whereas the use of transplants will usually give a higher yield (up to 38%), but the cost of establishment of the transplanted crop is near twice as high. The altered growing technique does not have the same complete sprout inhibiting effect as the use of maleic hydrazide. The low-sprout growing technique with five transplants in pots is now recommended for organic onion production in Denmark.

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ENHANCING EARLY PRODUCTION OF ARTICHOKE UNDER NEW RECLAIMED LANDS CONDITIONS

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This experiment was conducted at Menofya Governorate during 1998–99 and 1999–2000 seasons. The local artichoke cultivar (Balady) was used. Plants were sprayed with an aqueous solution of Perlix (GA₃) 2,3 and 4 sprays. GA₃ concentrations were 25 and 50 ppm. Spraying was started at the six true leaf stage and two weeks intervals. Results indicated that spraying with (GA₃) four times at 25ppm was the best treatment which increased early yield by about 25% as compared with the control plants. Moreover this treatment improved the quality of artichoke heads and increased the percent of exportable yield.

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ROLE(S) OF PHYTOHORMONES IN PROMOTING STORAGE ROOT GROWTH AND CONFIGURATION IN PROCESSING CARROTS

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Producing large, uniformly cylindrical storage roots is crucial for optimizing yield, grades and to obtain higher recovery of dicer carrots. Low PAR and low rainfall in Canadian Maritime provinces reduce the opportunity for root development and optimal sink activity. Since root bulking is a result of continued cambial activity, cell expansion and facilitated sink activities; and these processes are under hormonal control, exogenous application of specific plant growth regulators would promote storage root development and alter root configuration. Red Core Chantenay seedlings were cultured in Pro-mix under controlled conditions (16 h day length; 20 °C/16 °C day and night temperature) and ethephon, ACC (1-aminocyclopropane-1-carboxylic acid) and IBA (Indole-3-butyric acid), were applied through foliage at various concentrations, 16 days post-emergence. Growth of storage roots and tops were monitored 6 weeks after application. IBA at 0.1 ppm enhanced all the root growth parameters. ACC at all concentrations stimulated both shoot and root growth. Root bulking appears to be under the strong control of auxin and ethylene, perhaps by triggering cambial and root sink activities.

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TIME OF ONION DEFOLIATION INFLUENCES BULB YIELD

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Onions grown in New York are sometimes subjected to damaging hail-

storms, which remove foliage and may provide sites for infection by secondary organisms. Defoliation studies were conducted on direct-seeded and transplanted long-day onions to determine the effect of the time of defoliation on yield and quality. In 1999, in a direct-seeded trial on high organic matter soil in an unirrigated grower's field in Western NY, removal of the distal half of all leaves during growth reduced yield by 19% compared to controls. The reduction was greatest during bulb formation. A similar trial on an irrigated mineral soil in Ithaca, resulted in no significant yield differences between defoliation treatments and controls. In 2000 and 2001, transplanted onions were again subjected to 50% defoliation using leaf tip removal. Again, yield reduction was most severe when defoliation occurred during bulb formation, amounting to 32 and 26% for the two years, respectively. In all trials, the yield reduction was due to the formation of smaller bulbs. No significant incidence of bacterial diseases occurred in any of the trials. The results imply that the onion plant can tolerate moderate defoliation without decrease in yield, as long as growing conditions allow the plant to recover from the imposed stress.

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EFFECT OF PLANTING DATE ON VEGETABLE AMARANTH LEAF YIELD, PLANT HEIGHT AND GAS EXCHANGE

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Field studies were conducted for two years to determine the effect of six planting dates distributed at monthly interval from April to September on gas exchange, plant height, and fresh and dry matter yield of vegetable amaranth (*Amaranthus tricolor*L.). Seeds planted in April germinated poorly. Plant growth for September planting was inhibited due to the declining temperature during the fall season. It was observed that both soil and air temperature 25 °C or above promoted optimal stand establishment and growth. Amaranth had maximum CO₂ exchange rate (CER), plant height, and fresh and dry leaf yields when planted in June. The relationship between planting date and CER, transpiration rate (E), stomatal conductance (gs), plant height, and fresh and dry leaf yields was quadratic; while a cubic equation provided best fit between the planting date and internal leaf CO₂ concentration (Ci). Results of this study suggest that June is the best month to plant amaranth in the southern United States to obtain maximum leafy vegetable yields.

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EFFECT OF FRUIT THINNING ON ENDOGENOUS PLANT HOEMONES AND BEARING OF THE OLIVE (*OLEA EUROPAEA* L.) 'NABALI MUHASSAN'

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Fifteen-year-old 'Nabali Muhassan' olive trees in their 'on' year were either thinned by spraying the trees, 24 days after full bloom, with 100ppm naphthaleneacetic acid (NAA), or left unthinned. Changes in abscisic acid (ABA), indoleacetic acid (IAA), gibberellins (GAs) and cytokinins were determined from September until the following April in the lateral buds of the thinned and the unthinned trees using high performance liquid chromatography (HPLC). The results showed that free ABA concentration in the thinned trees was significantly higher than that in the unthinned ones. A significant increase in IAA concentration in the thinned trees was recorded during October and February, however, IAA concentration in the thinned and the unthinned trees throughout the sampling dates was almost the same. With the exception of December and February, free GAs concentration in the thinned trees was lower than that in the unthinned ones. Cytokinins concentration in the thinned trees was significantly less than that in the unthinned ones, however, the concentration increased sharply in the thinned trees during March. The thinned trees gave significantly longer shoots, larger fruit size, increased yield, and reduced number of retained fruits as compared to the unthinned trees. In the following season, however, the thinned trees gave increased number of perfect flowers and less number of staminate flowers per inflorescence and increased return bloom, and more number of fruit per shoot as compared to the unthinned trees. Thus it

seems that fruit thinning of the 'Nabli Muhassan' olive might regulate tree bearing and put to some extent control on alternate bearing through alteration of endogenous plant hormones.

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S25-P-13

A STUDY ON THE DETERMINATION OF SOME MECHANICAL PROPERTIES OF SOME WALNUT VARIETIES

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Walnut has an important protein source for human being and also profitable fruit for agricultural practices. Before consuming the walnut, its shell has to be broken and inner side should be taken out. The mechanical behaviour of the walnut is important for cracking. Improper or wrong cracking causes quite loss due to quality and fruit damage. Considering the mechanical behavior of the walnut changes with variety, physical and mechanical properties of each variety should be determined. The objective of this study was to determine the some mechanical properties; poisson's ratio and modulus of elasticity of different walnut varieties from Aegean region of Turkey. The compression test was applied on the walnut varieties in the load-displacement measurement device at the laboratory conditions. From the measured vertical forces and deformation, cracking force, stress and energy, poisson's ratio and modulus of elasticity of walnuts were determined. Experiment was repeated immediately after harvest from different trees so that the effect of variety and the region on the mechanical properties of the walnut was examined.

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S25-P-14

CONTRIBUTION TO DEVELOPMENT OF CONCEPT INTEGRATED FRUIT PRODUCTION (IFP) IN THE SOUTHERN AREA OF ROMANIA

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Romania is one of the European countries traditional in fruit production of cropped pomicultural species in temperate areas. Between 1999-2000 fruit production considerably decreased due to transfer of state property to private ownership. After the year 2000 strategy of pomiculture recovery and development assumes among others, establishing of some pomicultural agroecosystems, able to substitute declining plantations. The present writing aimed to show the contribution of the Research Baneasa to development of some pomicultural agroecosystems for the species apricot, peach, nectarine, cherry, sour-cherry, and plum, located in the southern zone of Romania. Construction of these agroecosystems is based on interdisciplinary research, by application of the concept "fruit integrated production," and of standards substantiated and checked by "the International Organization for Biological Control of Noxious Animals and Plants & International Society for Horticultural Science." A cybernetic system of syntheses and data and results has been achieved, system axed on the role of resistant cultivars and specific technologies and these, weeds control and soil management, irrigation forecast, phytosanitary protection, marketing of products obtained integrated system. Cultivars included in the pomicultural biocenoses are those allowing decrease of the number of treatments and technologies, with lower expenditures: Prima, Pioneer, Generos, Florina, Surprise, Liberty for apples; 77.3.60BV, 77.4.73 BV, 85.23.39BIV, Dacia, Excelsior, Olimp for apricot; Congres, Victoria, Triumf for peach; Romamer for nectarine; Nana for sour-cherry; Rivan, Boambe de Cotnari for cherry, a.s.o. The integrated soil management led to elaboration for fertilization recommendations of soils fertilizations based on a series of elements: cropping system and assortment, system of soil maintenance, biological peculiarities of species and roostock, age and trees organs, method of irrigation used, integrated control of diseases and pests, foliage diagnosis by phenophases. The marketing studies revealed acception by market fruits obtained under integrated system.

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SOIL INTEGRATED MANAGEMENT IN POMICULTURE AT SSCP BANEASAViorica Balan*¹, Ioan Gavriluta², Mihaela Cecilia Matei²

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Having in view ecologic peculiarities specific to tree plantations and of economic involvements linked with investment achieved at plantation, more elaborately knowledge of soil management factors under the conditions of maintenance and permanent improvement of soil fertility and to avoid pollution of environment, constitute a priority of modern pomiculture. From agrochemical standpoint, soil management in an integrated cropping system refers to a type of agricultural measures leading to avoidance of soils degradation, by optimization of agrochemical properties, maintenance and increase of nutrition capacity of these, by a way of elaboration of technologies for balances application of fertilizers (organic and mineral), ecopedologically differentiated, starting with pomicultural plantations foundation. Following the agrochemical study performed in SSCP Baneasa area, regarding the status of soil fertility and chances of agrochemical nature supervened (low pH in some plots, slight to medium nitrogen provision, low mobile phosphorous rate in some half of the area studied), revealed need for elaboration of a technological sequence, leading to improvement of productive capacity of these soils. These sequences impose : performing periodical control of fertility state in research plantations–development and extension by performing usual soil analyses, practiced in laboratories of agrochemistry, which allow to appreciate stage of soil supply with nutritive elements necessary to development of pomicultural plants; establishing the foliage diagnosis by analyses of plant sample by phenophases of development, to correct the nutritional state of these. In soils where pH reach limits to which trees necessitate optimizing this, it is recommended to perform amendments of these in view of elimination of acidity damaging pomicultural species : apricot, peach, nectarine, cherry, sour-cherry, apple, with cultivars resistant to diseases from the mother-plantations free of virus diseases and improvement of physical, chemical and biological features of soil after fertilization application.

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S25–P–16

HAZELNUT PRODUCTIVITY IN NORTHERN PORTUGAL: AN ECONOMETRIC APPROACH

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One trial involving eleven hazelnut cultivars was established near Vila Real,

Portugal, in 1984, to evaluate their growth and yield performance. The trees are grown as multistemmed shrubs, and the cultivars are Butler (B), Daviana (D), Ennis (E), Fertile de Coutard (Fc), Grossal (Gr), Gunslebert (Gu), Longue d'Espagne (Le), Merveille de Bollwiller (Mb), Morell (M), Ronde du Piemont (Rp) and Segorbe (S). Using observed production, we saw that the overall cumulative yield up to 2001 averaged 100 kg of nuts per bush, productivities being very different among the cultivars. The most precocious and productive table cultivar were B. Ennis produced less fruit than B in total, but showed higher yield efficiency. The best cultivars for industrial purposes were M, Tg and N. Nut characteristics are identical to those reported elsewhere for the same cultivars, but the frequency of blanks appears greater in this region. To complement the previous information with the aim of forecasting short run future values for the production of each cultivar, we use a time series econometric model with which we try to decompose the observed series into trend and irregular (seasonal and stochastic) components involved. Moreover, using a traditional log-log model, we compute the average annual increase rate of production.

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S25–P–17

USE OF LANDRACES FROM THE COMUNIDAD DE MADRID IN BIOLOGICAL HORTICULTURE

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When we tried the causes for those that the traditional products have been refused under the roller of the standardization and uniformity, it always meet any argument that seems solid and irrevocable; excessive size, fruits don't standardize, expensive harvest, less productive, worst resistance to the transport. It never is reasonable of organoleptic evaluation type or from nutrition factors or from healthy factors. The utilization of traditional varieties (landraces) in the biological modern horticulture, it is sufficiently guaranteed by a series of circumstances (adaptation to the medium, the most important), that in opposite of their theoretical obvious is supposed to be demonstrated with the rigorous maximal. From 1,995, the I.M.I.A. maintains a in vivo collection on traditional varieties of the Comunidad de Madrid in danger of disappearance. Any of these varieties (Negro Largo Escrito from Villaconejos melon, Mochuelo melon, Blanco Fino from Chinchón garlic and Moruno from Aranjuez Tomato) they join together some qualities in connection with the commercial varieties more utilized in their cultivation zone, that they convert them in extremely qualified for the requirements that should have the biological horticulture that they are the not utilization of products of synthesis in their cultivation and conservation and the utilization of systems integrals of traditional cultivation. In this study, they are made known data of cultivation and resistance to the pathologies and to the climatic factors more usual in this zone. The factors not agronomic is not analyzed, but we are supposed to make consist, for their importance, that is been about mythical products of the Comunidad de Madrid, for the one which supposes a previous knowledge of the possible consumers.

