Its value as a seed parent has been demonstrated and it will live on as its progeny, the Swenson hybrids, will continue to be evaluated after I am gone. It is my hope that many individuals will find fascination as I have in their association and involvement with them and as their breeding is continued by enthusiasts living in areas not considered suited for grape culture, so will those areas be supplied with adapted plants.

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Peach Breeding in Yugoslavia

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Abstract

The principal peach production regions in Yugoslavia lie in the Mediterranean zone and in the vineyard areas of the continental part of the state. Peach production in Yugoslavia is 91.860 MT. The leading peach cultivar is 'Redhaven' and the main nectarine is 'Stark RedGold.' Vineyard peach seedlings are the main peach rootstock.

The peach breeding centres in Yugoslavia are: Fruit Research Institute, Čačak; Biotechnical Faculty, Ljubljana; Agricultural Faculty, Zemun, Beograd; Fruit and Grape Research Station, Bolec, Beograd and Agricultural Faculty, Novi Sad.

The peach and nectarine breeding programs in Yugoslavia concentrate on: germplasm improvement, breeding early ripening cultivars, breeding late ripening fresh freestone cultivars and breeding canning clingstone peach cultivars adapted to continental climate. As well the programs include: inbreeding genetic dwarf, Pillar, sharka (Plum Pox Virus) and non-traditional breeding approaches.

Federal Committee of Agriculture in Beograd has released seven peach cultivars: 'Julia' (-20 'Redhaven'), 'Slovenia' (-12), 'Čačak' (-6), 'Dora' (+3), 'Maya' (+6), 'Vesna' (+8) and 'Radmilovčanka' (+50) in Yugoslavia.

Introduction

The peach was introduced to Greece in the time of Alexander the Great between 400 and 300 B.C. It was introduced in the area of Yugoslavia (Macedonia and Serbia) shortly after the beginning of Christianity.

Hesse (4) emphasizes the peach is primarily a tree of the temperate zones. The important centres of commercial peach production usually lie between latitudes 30° and 45° N and S. At higher latitudes minimum winter temperatures and spring frosts are the usual limiting factors.

Yugoslavia is between latitudes 41° and 47° N. Therefore, the main peach production regions in Yugoslavia lie in the Mediterranean zone and in the vineyard areas of the continental part of the state.

Production

Peach production is 91.860 MT, average 1981/85 in Yugoslavia which ranks the country seventieth in the world and seventh in Europa. This is 1.23 percent of the world and 2.37 percent of the European peach production respectively.

Among fruit and nut production in Yugoslavia, peach is in fifth place, after plum, apple, pear and sour cherry.

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Current Cultivars

The predominant peach cultivars grown in Yugoslavia, were developed in the United States.

Orchardists in the Mediterranean region of Yugoslavia (Zadar, Split, Opuzen, Titograd, Nova Gorica, Koper, Skopje, Titov Veles) grow over 25 peach cultivars, of which 'Springold,' 'Springcrest,' 'Dixired,' 'Early Redhaven,' 'Redhaven,' 'Regina,' 'Glohaven,' 'Suncrest' and 'Fayette' are the most important. Cultivar 'Stark RedGold' is the leading nectarine followed by 'Independence,' 'Stark Sun Glo' and 'Fantasia.'

'Redhaven' is the main peach cultivar in continental Yugoslavia (Beograd, Grocka, Smederevo, Niš, Bešenovo, Bela Crkva, Zagreb, Krško) followed by: 'Early Redhaven,' 'Redtop,' 'Maya,' 'Vesna,' 'Sunhigh,' 'Suncrest,' 'Black' and 'Cresthaven.' The leading nectarine cultivars are: 'Early Sungrand,' 'Stark Sunglo' and 'Stark RedGold.'

Vineyard peach seedlings are the main peach rootstocks in Yugoslavia. When vineyard peaches are used as rootstocks in continental Yugoslavia, no peach replant problem appears, at least in second planting.

The vegetative rootstocks GF 677, Damas 1869 and Saint-Julien GF 655.2 are in use occasionally.

History of Peach Improvement

First peach breeding program in Yugoslavia began in Fruit Research Institute at Čačak in 1950. The breeders are: Staniša A. Paunović and Dobrivoje Ogašanović.

Peach breeding program started in the early 1960s in Biotechnical Faculty, Ljubljana (A. Fornazarić, France Adamič, Milena Leksăn and Julija Smole) and in Agricultural Faculty, Zemun-Beograd (Borivoje Pejkić and Mirko Tomović).

A peach breeding program was initiated in Research Institute "PKB-Agroekonomik," Fruit and Grape Research Station, Boleč-Beograd in 1974. The breeders are: Petar D. Mišić, Radmila R. Todorović, Vladimir Ž. Pavlović, Milan A. Mirković and others.

The youngest peach breeding program started in Agricultural Faculty, Novi Sad in 1985. The breeders are: Vladimir Ognjanov and Dinka Vujanić Varga.

Breeding Objectives

The objectives of peach and nectarine breeding programs in Yugoslavia concentrated on:

1. Germplasm improvement
2. Breeding early ripening peach and nectarine cultivars
3. Breeding late ripening fresh freestone peach and nectarine cultivars
4. Breeding canning clingstone peach cultivars adapted to continental climate.

Yugoslav peach and nectarine breeders take interest in the following programs, too:

1. Study of inbreeding in peaches.
2. Breeding genetic dwarf and semidwarf peaches and nectarines.
3. Genetics and breeding narrow-angled (Pillar) peaches.
4. Study of sharka virus in peaches and nectarines.
5. Non-traditional breeding approaches.

Germplasm Improvement

Prosperous peach and nectarine breeding programs may be realized, if variable germplasm is available to the breeders. Therefore, Yugoslav peach collections were gathered from abroad (U.S.A., Italy, China, etc.) and by exploration, selection and evaluation of vineyard peach population from different areas of Yugoslavia.

The results thus far indicate that there is a high degree of genetic diversity in this population of peaches, some with tolerance to cold and disease stress. Differences have been

found in tree vigor, time of ripening, fruit size and quality, yield, seed germination, vigor of the seedlings and the behaviour of peach cultivars on different vineyard peach selections.

Breeding early ripening peach and nectarine cultivars

Early ripening peach and nectarine cultivars are important for the Mediterranean region of Yugoslavia. Since the seeds of early ripening cultivars and selections are not entirely developed, in vitro embryo culture techniques are being improved and used.

Breeding late ripening fresh freestone peach and nectarine cultivars

This is a very significant breeding goal for continental Yugoslavia. Namely, it is necessary to develop hardy, self-fertile, productive, large, attractive, firm, good quality, yellow-fleshed, freestone peach and nectarine cultivars, ripening after 'Redhaven' and particularly after 'Cresthaven.'

New Yugoslav peach cultivars 'Maya' (+6 'Redhaven') and 'Vesna' (+8) are successful introductions from this breeding program.

The current breeding program focuses on very late ripening cultivars. Some of the late ripening cultivars, such as: 'Fayette,' 'Radmilovčanka' and 'Summerset' are being used as parents.

Breeding canning clingstone peach cultivars adapted to continental climate

Method of hybridization between Yugoslav freestone peach cultivars ('Maya,' 'Vesna,' 'Radmilovčanka') and canning clingstone peach cultivars ('Loadel,' 'Vivian,' 'Babygold 6,' Babygold 7,' 'Andross'), raised in warmer climates of the United States, have been used in order to develop canning clingstone cultivars adapted to the continental climate in Yugoslavia. Some of the F_1-hybrids ('Maya' x 'Babygold 6') are promising.

Studies of inbreeding in the creation of peach cultivars were done by Scorza et al. (14) and Mišić et al. (8). Data in the papers have emphasized that the genetic diversity of current peach cultivars is limited.

Breeding genetic dwarf and semidwarf peaches and nectarines

This breeding program began in 1987 by crossing standard peach cultivars 'Maya' and 'Vesna' with pollen of the genetic dwarf selections of peach (4,7-31 and 2,33-87) and nectarine (1,45-14 2,47-99), which were provided by courtesy of Dr. Paul E. Hansche, Department of Pomology, University of California, Davis. The hybrids of F_1-generation are all of standard size.

Prof. Carlo Fideghelli, Istituto Sperimentale per la Frutticoltura, Roma,

Table 1. New peach cultivars released in Yugoslavia.

Cultivar	Parentage	Maturity (Redhaven 0)	Flesh color	Pit freeness	Year released	Origin
Slovenia	Halberta x Pistoia	-12	Y	SF	1968	BF Ljubljana
Radmilovčanka	Bud mutation of J. H. Hale	+50	Y	F	1974	AF Beograd
Čačak	Veteran x Early East	- 6	Y	SF	1975	FRI Čačak
Maya	Glohaven x Glohaven	+ 6	Y	F	1985	FGRS Beograd
Vesna	Glohaven x Glohaven	+ 8	Y	F	1985	FGRS Beograd
Julia	Redhaven x Collins	-20	Y	SF	1986	FRI Čačak
Dora	Elberta x Springtime	+ 3	Y	F	1986	FRI Čačak

Flesh color: Y = yellow
Pit freeness: SF = semi-freestone
F = freestone

Origin: BF = Biotechnical Faculty
AF = Agricultural Faculty
FRI = Fruit Research Institute
FGRS = Fruit and Grape Research Station

Italy has given to us budwood of some genetic dwarf peach selections in August 1988.

Genetics and breeding narrow-angled (Pillar) peaches

In order to start in Yugoslavia with this program, the source Pillar peach materials were received from Prof. Daniele Bassi, Bologna and Dr. Alessandro Liverani, Forli, Italia in February 1989.

Study of sharka virus in peaches and nectarines

Sharka (Plum Pox Virus) on peaches and nectarines was discovered in Hungary (1962), Greece (1968), BR Germany (1974), France (1974) and Yugoslavia in 1986 (3).

A visual inspection of the collected clone material and seedlings of peach vineyard selections in the nursery and peach collection at Fruit and Grape Research Station, Boleč, Beograd. Characteristic symptoms of Sharka on the investigated peach vineyard selections were not found out.

Non-traditional breeding approaches

The techniques include anthers, cotyledons, leaf discs and roots in vitro cultures.

The anthers of peach cultivars were used for haploid production. The anthers with microspores at uninucleated stages were cultured on Nitsch and Nitsch (11) medium with the addition of growth regulators at different combinations and concentrations. Zeatin is one of the most promising growth regulators (cytokinin) for callus formation from peach anthers.

Ognjanov (13) has induced callus formation and root differentiation from leaf discs and root of peach seedlings obtained in embryo culture, as well as from peach cotyledons.

Cultivars Released in Yugoslavia

Yugoslav breeders have developed seven peach cultivars, which were released by the Federal Committee of Agriculture in Beograd (Table 1). Six cultivars ('Julia,' 'Slovenia,' 'Čačak,' 'Dora,' 'Maya' and 'Vesna') are the products of intraspecific hybridization and one originated from a bud mutation ('Radmilovčanka').

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Evaluation of Strawberry Cultivars with Different Degrees of Resistance to Red Stele[1]

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Abstract

Sixteen commercially grown strawberry cultivars with different degrees of resistance to red stele were evaluated for yield, plant characteristics and fruit quality. 'Bounty,' 'Midway,' and 'Sparkle' had sufficient interior and exterior fruit color, good to satisfactory flavor and are suitable for freezing. However, these cultivars as well as 'Redcoat' lacked sufficient fruit firmness. 'Bounty,' 'Redcoat,' 'Redchief' and 'Sparkle' had the highest yield in the three-year test. 'Annapolis,' 'Earliglow' and 'Scott' had reflexed calyx whereas 'Allstar,' 'Annapolis,' 'Cornwallis,' 'Earliglow,' 'Guardian' and 'Sunrise' were characterized by a raised neck suitable for mechanical dehulling. 'Sunrise' appeared to be the only cultivar free of leaf scorch and leaf spot. 'Tristar,' 'Redchief,' 'Lester,' 'Darrow' and 'Arking' roots had the lowest incidence of red stele when planted in a naturally-infested field. No relationship between fruit characteristics was observed (except for calyx and neck) which suggests the necessity to examine each individual trait.