an aluminum foil shield on the undersurfaces of young leaves. The suspension of bacteria is applied to the exposed area with an artist's air brush at 25-30 psi held approximately 1 to 2 inches from the leaf surface, until the underlying tissue is water soaked. Excess inoculum is rinsed off the leaf surface with water. After inoculation, plants are held in a controlled environment room at approximately 27°C and near 100% relative humidity for 5 days before being returned to normal greenhouse conditions. Host reponse to *X. pruni* infection is evaluated 10-14 days after inoculation.

With inocula containing 10^2 to 10^5 CFU/ml, the number of lesions induced by *X. pruni* is directly proportional to the number of CFU in the inoculum. Approximately 16-18 CFU are required to cause a single lesion. However, from log-dose/probit-response analyses, cells in the inoculum are inherently capable of acting independently *in vivo,* to induce a host response (i.e., lesion), characteristic of natural host-phytopathogenic interactions. Qualitatively the types of lesion induced by *X. pruni* in young peach and apricot seedling leaves range from minute, non-spreading, necrotic lesions to large, spreading, greyish-white lesions with little or no necrosis. The host response to *X. pruni* infection is evaluated by accurate and precise probit analysis of dose/response data, the number of lesions per inoculation site and/or the type of lesion formed. Populations of peach and apricot seedlings have been inoculated in the greenhouse as described above. Several individuals have been vegetatively propagated from buds to obtain several plants of the same genotype that could be reinoculated and evaluated under greenhouse conditions. Several individual peach and apricot seedling selections have been planted in the field in order to evaluate the relationship between host response to *X. pruni* infection under controlled conditions and resistance to *X. pruni* under natural conditions.

Research in Plum Breeding in Romania

VASILE COCIU
Institutul de Cercetari pentru Pomicultura, Pitesti, Maracineni, Romania

Plum *(Prunus domestica L.)* production in Romania amounts to more than 54% of the total fruit production.

There are hundreds of native cultivars but only 20-25 are of commercial importance. Among these the three most important are:

'Tuleu Gras' with very good quality fruits, 30-35g, ripening in the second decade of August. It exhibits cytoplasmic male sterility.

'Vinete Romanesti' with very good flavor, small size 18-20g, ripening after September 15.

'Grase Romanesti' with good quality fruits, 25-30g, clingstone, ripening the second half of September.

Breeding work with plums was started 25 years ago in order to develop: earlier ripening for fresh consumption; late ripening with high soluble solids for drying; disease resistance, especially to *Monilia,* polystigma and plum pox; and trees with better crowns that would need less pruning and facilitate other cultural practices.

The breeding program is in its third generation of crosses which go back

to the native cultivars crossed with introduced foreign cultivars. Irradiation of buds, seeds and pollen has also been used. An important objective now is the development of cultivars with deep blue color, large fruit size, more than 20% dry weight, and a small stone (less than 5% of fruit weight), suitable for the food industry, especially dehydration.

Results

The number of crosses made and seedlings obtained are given in Table 1.

Table 1. Extent of Plum Breeding 1950-1973

Period	Number of Combinations	Flowers Pollinated	Seeds and Seedlings Obtained			
			No.	%	No.	%
1950-1959	322	125,559	17,547	13.9	4,431	25.3
1960-1970	345	373,167	60,407	16.2	17,694	29.0
1971-1973	549	532,739	65,219	12.2	20,514	31.4
Total	1216	1,031,465	143,173	13.9	42,639	29.8

It was determined that cytoplasmic male sterility exists in the 'Tuleu Gras' cultivar. Cytological investigation showed an exaggerated development of the tapetum at the expense of the sporogenous tissue. This sterility has been transmitted completely for three generations.

Using 'Tuleu Gras' as female, the good branching angles of the male parents 'Anna Spath', 'Italian prune', 'Reine Claude Noire' and 'Agen' were transmitted to 50-70% of the progeny.

Characters such as date of first bloom and season of ripening segregate widely. Consequently it has been possible to make selections blooming later than either parent. It has also been posible to select seedlings that ripen earlier than either parent. But

Table 2. Brief description of freestone plum selections in Romania (1960-1973)

Selection	Parents	Form	Fruit			
			Size in grams	Stone—% of fruit weight	% dry matter	Date of ripening
Baneasa 1/2	Reine Claude Althan x Early Rivers	Globular	38	3.5	16.5	1-10 VII
Baneasa 12/22	Tuleu Gras x Early Rivers	Ovoidal	40.5	2.5	12.4	15-20 VII
Blue Danube	Reine Cl. Alt. x Early Rivers	Truncated-conic	50-55	3.2	19.8	20-30 VII
Baneasa 5/20	Reine Cl. Alt. x Early Rivers	Globular	40	2.8	18.3	22-31 VII
Baneasa 7/20	Reine Cl. Alt. x Early Rivers	Globular	45	3.3	22.2	1-10 VIII
Baneasa 16/27	Tuleu Gras (X-rayed seeds)	Ovoidal	55	3.7	22.0	5-15 VIII
Baragan 17/30	Tuleu Gras x Early Rivers	Ovoidal	42	2.8	20.5	10-15 VIII
Stanley	Agen x Grande Duke	Ovoidal-long	35	5.5	14.0	20-30 VIII
Baneasa 29/60	Tuleu Gras (X-rayed buds)	Ovoidal	55	2.9	20.8	20-30 VIII
Baneasa 30/65	Tuleu Gras x Peche	Ovoidal	55	4.8	20.2	1-5 IX
Baneasa 11/17	Reine Cl. Alt, x Wilhelmina Spath	Rather globular	55	3.2	22.3	5-15 IX

under our conditions seedlings ripening later than the latest parent have not be observed.

'Reine Claude d'Althan' transmits a good crown with short fruiting spurs that require little pruning, large fruit size, and firm flesh.

'Early Rivers' and 'Wilhelmina Spath' in combination with 'Reine Claude d'Althan' and 'Tuleu Gras' transmitted early ripening, large fruit size and attractiveness (blue skin color being dominant in these crosses).

For the plums, most of the important characteristics may be adequately determined during the first two years of fruiting. The knowledge of this fact makes it possible to reduce the time and expense for initial seedling evaluation.

Ten selections are on trial (Table 2). 'Stanley' is included in the table for comparison.

Use of Ionizing Radiation in Fruit Breeding

M. M. THOMPSON
Oregon State University, Corvallis, Or.

There is an apparent lack of interest by U.S. plant breeders in the use of induced mutations whereas in Europe, and elsewhere, this tool is being used widely and successfully. The International Atomic Energy Agency in cooperation with FAO has, since 1966, stimulated interest and disseminated information on methodology and achievements through a series of Panels, Symposia, Training Sessions, Research Coordination Meetings, and the Mutation Breeding Newsletter which provides rapid communication between research workers. This tool offers particular promise for fruit crop improvement because 1) the long generations, large space requirements, and heterozygosity make it impossible to transfer particular traits into otherwise successful cultivars by conventional breeding methods, 2) many present cultivars arose by spontaneous mutation, and 3) vegetative propagation ensures immediate perpetuation of new types. From the industry's standpoint (handling, processing, and marketing) an "improved" well-known cultivar has definite advantages over a completely new type. The use of induced mutations should be considered in programs where the objective is to improve one trait (or two in successive steps). Traits that have been induced in fruit crops include compact growth habit, fruit color changes, earlier and later flowering and fruit maturity, increased and decreased fertility, and self-compatibility in sweet cherries (never identified before). The induction of disease resistance is receiving a major thrust in the IAEA program. By 1973, 24 crop cultivars had been released with improved disease resistance from mutagenic treatment. As yet, no extensive programs for inducing disease resistance in fruit cultivars have been reported although this technique appears promising. In Oregon our prime objective is to induce compact mutants in sweet cherry. We are also screening for bacterial canker *(Pseudomonas)* resistance. I urge my colleagues to communicate mutation breeding results, both positive and negative, so that, collectively, we can achieve more rapid advances in methodology and practical achievements.