President's Message

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TO: Members of the American Pomological Society

As president of the American Pomological Society, it seems that one of my main duties will be to stimulate an increase in submission of manuscripts to the Fruit Varieties Journal. The Journal has been an exceptionally useful publication to the research worker, as well as to the extension worker and to the grower involved in fruit production. Its future usefulness can only be ensured if there is a continuous input of manuscripts of a research or production nature with the emphasis on variety and other factors.

In this issue, I have a report on the British Columbia red raspberry and strawberry breeding programs. Reports of a similar nature from several different programs have appeared in past issues of the Journal. However, there are a large number of other fruit research programs from which reports would be of much interest to the Journal.

This Journal is the natural place for the publication of descriptions of new varieties. In most cases such descriptions have appeared in HortScience or in other publications. However, these publications do not reach nearly as wide a cross section of readers on an international basis, including both commercial and amateur growers, as this Journal does. It seems that the breeder, who has developed the new variety, can easily rewrite the description in a way that would make it appealing to the wide range of readers who subscribe to the Journal. Also, the Journal is the most suitable publication for reports on changing variety situations for specific fruit crops in different regions.

Finally, it is hoped that both commercial and amateur growers will increase their input to the Journal by recording observations on variety performance.

The British Columbia Red Raspberry and Strawberry Breeding Programs

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Southwestern British Columbia is considered to be the most effective and efficient region in Canada for the production of both high quality red raspberries (*Rubus idaeus* L.) and strawberries (*Fragaria* x *ananassa* Duch.). Furthermore, it is considered to be one of the most effective regions in the world for the production of red raspberries. It accounts for more than 90% of Canada's production of this crop and approximately 30% of the total North American production. Approximately 40% of Canada's strawberry production comes from the region. The effectiveness of production of both crops may be even more appreciated in the future when costs of

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importing fruit are likely to become increasingly prohibitive and local production will increase in importance. The objectives of the British Columbia breeding programs for both crops are to increase production efficiency to higher levels.

This paper will give the objectives of each program and, in addition, make reference to recent progress towards meeting some of these objectives.

Red Raspberry

1. Fruit rot resistance is an essential feature of cultivars adapted to machine harvest and for cultivars that have a prolonged shelflife for the fresh market. Resistance is also important for reducing the number of hand-harvests which subsequently reduces labor costs. Most of the fruit rot is caused by *Botrytis cinerea* Pers. ex. Fr. and by *Rhizopus* spp. (probably *R. stolinifer* [Ehr ex. Fr] Vuill). The program has identified the once commercially important cultivar, Cuthbert, as a source of resistance to both organisms (9). This source has been subsequently incorporated into the breeding program. For example, the recently released cultivar Nootka derives its fruit rot resistance from Cuthbert. A second source of resistance to *B. cinerea* has been identified in derivatives of the black raspberry (*Rubus occidentalis* L.) obtained from the Scottish Horticultural Research Institute (9). This source is now being incorporated into breeding lines of the program in order to broaden the genetic base of resistance.

2. Immunity to the aphid vector (*Amphorophora agathonica* Hottes) of raspberry mosaic virus (RMV) is considered an essential part of the program so that British Columbia red raspberries will continue to escape RMV. This virus has been a limiting factor in production in much of eastern Canada and the north-eastern United States (1, 13). Several years ago a single dominant gene for immunity to the aphid from the Lloyd George cultivar was incorporated into the breeding program (3). The Haida cultivar, released in 1973, as well as the more recent releases Skeena and Nootka, have this gene as do most of the advanced selections. Recently, new sources of immunity to the aphid have been found in the indigenous North American red raspberry, *R. idaeus* subspp. *strigosus* (Michx.) (Daubeny, unpublished data). Some of these sources will eventually be used in the program to diversify the genetic base of immunity. By doing this a breakdown of the Lloyd George source of immunity, due to the appearance of strains of *A. agathonica*, might be avoided. Fortunately the *A. agathonica* strain situation has remained stable for at least 40 years (1).

3. Resistance to spur blight, caused by *Didymella applanata* (Niessl) Sacc. has become an important objective in the past few years. Haida has a relatively high level of resistance to the disease (8). Infection by *D. applanata* is considered to reduce yield by the physiological inhibition of buds in the crop-producing region of the canes (15). Resistance is equated, to at least some extent, with escape from the "dead bud" condition, an important component of the general decline syndrome noted in some years in Willamette, the main commercial cultivar in the region (12). Inheritance of resistance to spur blight is quantitative and predominantly additive in nature (8).

4. A high level of self-fertility is necessary for a cultivar which is to be grown under the monoculture conditions that exist in much of the present day commercial production (4). Older cultivars often lacked complete self-fertility. All advanced selections are evaluated for self-fertility.

5. Selection for resistance to powdery mildew, caused by *Sphaerotheca alchemillae* (Grev.) L. Junell, is an

integral part of the program. It is important that the cultivars introduced by the British Columbia program do not show the high level of susceptibility that the Carnival cultivar does. This cultivar, when introduced, seemed ideally suited to Eastern Canadian conditions because it produced high quality fruit, was immune to *A. agathonica* and was winter hardy. However, its susceptibility to powdery mildew has appeared to restrict its usefulness. Cooperative studies between the British Columbia program and the comparable breeding program at the Scottish Horticultural Research Institute established that inheritance of resistance to the disease could be explained on either a qualitative basis (with 3 gene pairs involved) or a quantitative basis (with additive gene action involved) (5).

6. Resistance to the meadow lesion nematode, *Pratylenchus penetrans* (Cobb, 1917) Filipjev and Schuurmans-Stekhoven, 1941, has recently been added to the objectives of the program. This nematode has been associated with the decline syndrome in Willamette (11). Preliminary evidence indicates that there are variations in resistance to the nematode among cultivars (McElroy, unpublished data). Efforts are now underway to develop an effective technique to screen seedlings for relative resistance.

Strawberry

1. **Fruit rot resistance** is considered an absolute necessity for any form of harvest in the future whether it be reduced numbers of hand-harvests, necessitated by high labour costs, or machine harvest. Resistance is also necessary for prolonged shelflife for the ever-increasing fresh market outlets. New sources of resistance have recently been identified (10). Diversification of resistant sources is necessary when the breakdown of effectiveness of chemicals, such as benomyl, in controlling *Botrytis cinerea* is considered (*B. cinerea* is the main causal agent of pre-harvest rot and, along with *Rhizopus* spp., the main causal agent of post-harvest rot).

The effectiveness of the work in breeding for fruit rot resistance is illustrated by the case of the Totem cultivar, released from the program in 1971, and now the most important cultivar in B.C. Under commercial conditions the incidence of rot in Totem is at least 50% less than that in Northwest, previously the most important cultivar. There are selections now being propagated which show even more resistance than Totem.

2. **Tolerance to a complex of virus strains** continues to be a prime objective of the program. There have been many high quality cultivars tested in the region which have failed because of the lack of tolerance (7). Totem and the advanced selections in the program are tolerant.

3. **Winter hardiness** is another important objective. When Northwest was the most widely planted cultivar in the region, winter injury was considered to be the greatest limiting factor in production (6). Since then Northwest has been replaced by the more hardy Totem and winter injury is not considered to be as great a limiting factor.

4. **Resistance to red stele root rot** caused by *Phytophthora fragariae* Hickman, is also an objective of the program although it has been given less emphasis in recent years in comparison with other objectives. The main reason for this is that production has moved from the heavier soils, where the causal organism is more likely to be present, to lighter, better drained soils. Nevertheless, Totem and Cheam, another cultivar released from the program, show a high level of resistance to a composite of 5 races of the causal organism and in the case of Cheam, a high level of resistance to 3 individual races (14).

5. **Resistance to powdery mildew** caused by *Sphaerotheca macularis* Wall. ex. Fr., is another objective of the program. Resistance means that spraying for control, in years in which the disease is severe, can be avoided. Totem and most of the advanced selections in the program are resistant.

6. **Diversification of ripening period** is becoming an important objective of the program. This diversification is particularly pertinent to the fresh market where an extension of the ripening season is highly desirable.

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Evaluation of 'Golden Delicious' Strains

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From time to time it appears appropriate to report on the search for a new russet-free 'Golden'. The true 'Golden Delicious' (non-spur, virus free), in my opinion, is still in top position as the over-all *best* of the yellow apple varieties grown in the Pacific Northwest. However, as most growers and marketers know, it is *not* a perfect apple. Both spur and standard 'Golden Delicious' have several faults which are the basis for the search of a "superior 'Golden' type."

Since russet is not a problem of 'Golden Delicious' in our northwest apple districts, we focus our attention on the new yellow apple varieties. Most of these are new seedling dis-

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