larger tree size on MM106 resulted in a 16% greater yield per tree. Precocity was very similar on both rootstocks with the more precocious cultivars beginning to bear in 1969, three years after planting. Production efficiency evaluated by per acre yields calculated with actual tree size or pounds of fruit per square inch of trunk cross section indicate no difference in the efficiency of these rootstocks.

The Gilpin Westmore clay loam soil at this site has a very high soil moisture holding capacity, a fragipan at about 18-24 inches in some locations, with less than desirable internal soil drainage. Significant tree loss began to occur in 1972 and pathologists were able to isolate *Phytophtora cactorum* from several trees on both rootstocks. Evaluation in 1972 indicated that only 3% of the MM106 and 12% of the trees on M26 had died. However, in 1976 these figures had risen to 31 and 22%, respectively. Although tree losses were spread over many cultivars, the greatest losses occurred in the following cultivars (with the first figure being % loss on MM106 followed by the % loss on M26): Holiday (60%, 35%), Chelan Red (33%, 29%), Starking (23%, 11%), Idared (18%, 10%), Melrose (17%, 28%) and Red Prince (15%, 9%). Much of the loss with Holiday occurred with the trees breaking at the union. It should be noted that all 3 strains of Delicious had significant losses with many trees showing collar rot type symptoms. The excessive tree loss and the weak nature of the root systems at the conclusion of the study indicated that neither MM106 or M26 are tolerant of the less than desirable internal soil drainage encountered in this study.

'Cullinan' and 'Havis' Peach Cultivars

H. W. FOGLE AND H. L. KEIL[1]

Two peach cultivars, named for the peach breeders who conducted the U.S. Department of Agriculture breeding program at Beltsville, Maryland from its inception in 1932 until 1962, were released in June, 1977. On July 22, 1977, a Peach Day, featuring ripe fruit of 'Cullinan,' honored Dr. Frank P. Cullinan and the widow and son of the late Dr. Leon Havis. Among the 45-50 persons attending the ceremony were nurserymen, growers, research and extension workers, and the press.

'Cullinan' was named for Dr. Cullinan, who initiated the peach breeding program at Beltsville and later served as Associate Director of the Crops Research Division. Among his many accomplishments, Dr. Cullinan was President of the American Society for Horticultural Science, the American Society of Plant Physiologists and the American Institute of Biological Sciences; member of the governing board of the National Research Council; and member of the Science Manpower Commission. He was awarded the Wilder Medal in 1964 by the American Pomological Society.

'Havis' was named for Dr. A. Leon Havis, who was the peach breeder at Beltsville as well as leader of stone fruit investigations for USDA from 1943 until his untimely death in 1962 (1). He was President of the Ameri-

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Fig. 1. A 'Cullinan' peach receives critical evaluation by its namesake.

can Pomological Society in 1957-58. The USDA peach breeding program which he headed was awarded the coveted Wilder Medal of that Society in 1951. He also received the Gourley Award from the American Society for Horticultural Science in 1952.

Origin

'Cullinan' was selected in 1966 from a 31-seedling progeny of 'McNeely' x 'Goldenred' crossed in 1963. It was tested as selection B64019 at Beltsville and in adaptation tests at experiment stations in Arkansas, South Carolina, North Carolina, West Virginia, Pennsylvania, New York, and several New England states.

'Havis' was selected in 1965 from 100 seedlings of the cross 'Dixiland' x 'Sentinel' made in 1962 by Dr. Havis. It was tested as selection B63221 at Beltsville and at several northeastern experiment stations.

Characteristics

'Cullinan' ripens 7 to 10 days later than 'Redhaven' and appears well suited as a companion variety to 'Redhaven.' Unlike 'Redhaven,' it seems capable of producing large fruit size despite relatively heavy crops. The fruit is yellow-fleshed, firm, freestone, and has good quality. Approximately 80 percent of the fruit surface has a bright red blush and the undercolor is bright yellow. Pubescence is short and sparse. Flesh color is a bright yellow, usually with no red veination. The blossoms are non-showy and self-fertile. Glands are reniform.

Trees of 'Cullinan' are productive and vigorous. In tests using the screening technique developed by Civerolo and Keil (2), 'Cullinan' was rated more resistant to bacterial spot *(Xanthomonas pruni)* than its relatively resistant parent 'NcNeely' (Table 1)

Table 1. Ratings of resistance of peach clones to bacterial spot infection in leaves of young greenhouse-grown trees, 1977.

Clone	Av. No. Lesions per inoculation site and lesion type[1]	Remarks
Sunhigh seedling	9.0 (A-D)	
N.J. 236	7.9 (B-D)	
Sunhigh cultivar	6.8 (B-C)	
McNeely	5.0 (A-B)	Small, reddish necrotic lesions which dry out rapidly.
Havis	4.0 (B-D)	
Cullinan	2.8 (A-B)	Minute, reddish necrotic lesions, some with tiny halos, which tend to dry out rapidly.

[1]Lesion type:
A – hypersensitive reaction without halos
B – discrete lesions with small halos
C – discrete lesions with large halos and with some coalescing
D – larger necrotic lesions with large halos and with much coalescing.

and most resistant of the clones tested. The vegetative growth of 'Cullinan' was rated moderately resistant to brown rot *(Monilinia fructicola)* following a severe hailstorm at Beltsville in 1975. Flower bud hardiness of 'Cullinan,' appears to be good, as judged by thinning required in 1976 and 1977 after late frosts that resulted in light fruit sets in most cultivars.

'Havis' ripens about 5 days later than 'Redskin.' The fruit is yellow-fleshed, freestone, moderately firm, sometimes with considerable redness in the flesh near the pit cavity, and has good quality. Bright red blush covers 80 to 90 percent of the fruit surface and the undercolor is attractive yellow. Pubescence is short and sparse. Blossoms are non-showy and self-fertile. Glands are reniform.

Trees of 'Havis' are vigorous and productive. Leaves and fruits have shown moderately good resistance to bacterial spot *(X. pruni)*. Trees subjected to a severe hailstorm in 1975 were rated in the group most resistant to infection of vegetative growth by brown rot *(M. fructicola)*.

Both cultivars have been tested primarily in the eastern United States but are suggested for trial in other producing areas. 'Cullinan' appears promising to fill the ripening season immediately following 'Redhaven' and 'Havis' to supply a productive cultivar just before 'Rio Oso Gem' season.

Fig. 2. A branch of 'Havis' peach.

Trees of both cultivars will be available from commercial nurseries in the Fall of 1978.

Literature Cited

1. Kessler, G. M. 1962. Andrew Leon Havis 1909-1962. *Fruit Var. and Hort. Digest* 17:2.
2. Civerolo, E. L. and H. L. Keil. 1976. Evaluation of *Prunus* spp. resistance to *Xanthomonas pruni* by artificial inoculation. *Fruit Var. J.* 30:17-18.

Minnesota Grape Growers Association

This Association was established in 1975 for the purpose of advancing the art and science of grape growing in cold climate areas. Membership in the Association includes a yearly subscription to the "Minnesota Horticulturist," a copy of the annual yearbook, and information exchange with other grape growers. Members also enjoy wine tasting and vineyard tours. Membership dues are $7.50 per calendar year, or $3.00 for those already members of the Minnesota State Horticultural Society. Checks should be sent to: Tom Fruth, President, Minnesota Grape Growers Association, 1729 3rd St., S.W., New Brighton, Minn. 55112.