FIELD PERFORMANCE OF *IN VITRO* PROPAGATED BLUEBERRIES

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Abstract. 'Northblue' half-high hybrid blueberries were propagated *in vitro* and plants were planted in three locations in extensive field plantations for comparison with cutting-propagated plants. Beginning in the second year following transplanting, yields were significantly higher for the *in vitro* propagated plants for the next three years. Yield increases were attributed to a greater number of basal branches, and a larger number of flower buds. There were no differences in fruit size or quality.

REVIEW OF LITERATURE

Several researchers have reported methodologies for propagating various types of blueberries *in vitro* (2, 7, 11) We wished to establish potential commercial plantings of the half-high, relatively winter hardy blueberry types developed in the breeding programs initiated by Cecil Stushnoff and continued by James Luby (8). It was deemed appropriate to develop *in vitro* propagation schemes for propagation of the relatively difficult-to-propagate types resulting from these breeding programs. We were successful in developing such propagation systems (2, 3, 5). The logical next question was, do these *in vitro* propagated plants perform in a fashion equivalent to conventionally propagated blueberries? Therefore, field trials were established to ascertain the field performance potential of *in vitro* propagated 'Northblue' blueberry plants.

MATERIALS AND METHODS

In the winter of 1982, plants were propagated by cuttings and by *in vitro* methods, and then grown in greenhouses at the University of Minnesota. They were subsequently stored over winter in appropriate cold storage facilities and planted for comparison into three Minnesota field locations: Grand Rapids, Becker, and St. Paul. Details of propagation methodology, storage conditions and site characteristics for the field plantings can be found in previous publications (3, 4, 6). Measurements were made of number and length of basal branches, number and length of lateral branches, flower buds per branch, total number of flower buds, fruit yield in grams per plant, and fruit weight in grams per berry.

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RESULTS AND DISCUSSION

Yields were significantly higher for the *in vitro*-propagated plants in each harvest year following establishment (Figure 1). Similarly, differences in fruit yield and growth habit have been reported for strawberries (1, 9) and blackberries (10). The increased yield in blueberry was related primarily to the increased number of flower buds on the *in vitro*-propagated plants which was correlated with a greater number of basal branches. Figures 2a and 2b illustrate the difference in growth habit between plants propagated by the two methods. It was also noted that the *in vitro* propagated plants suffered less winter injury, possibly because of the ability of the more basal branching growth habit to hold snow and thus insulate the plants against the cold.

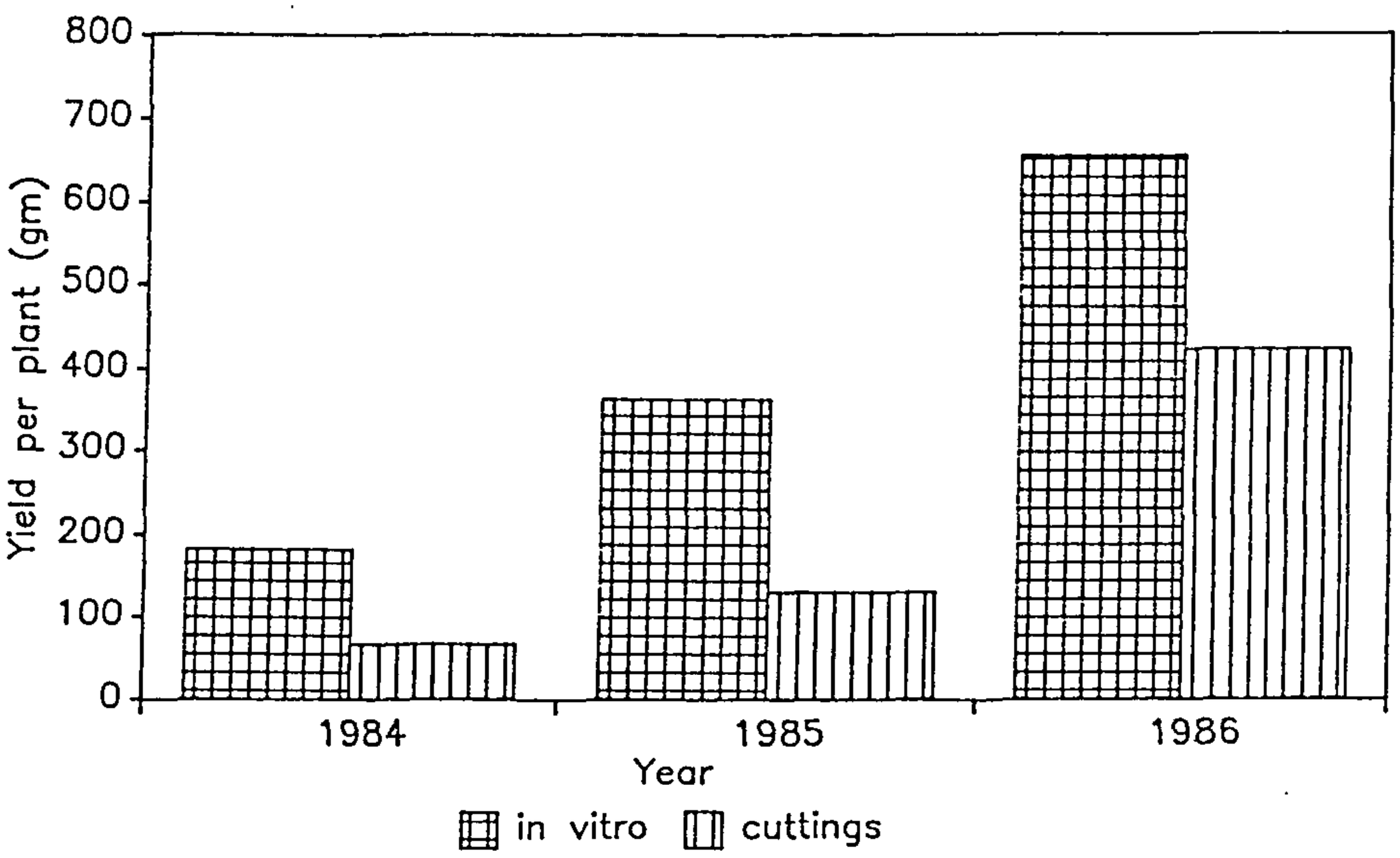

Figure 1. Effect of propagation method on yield of 'Northblue' blueberries field-planted June 1, 1983.

This research is significant for a number of reasons. Since *in vitro* propagation of these types of blueberries is more efficient and cost effective than conventional propagation, it is critical that they perform in an equivalent or superior manner to the conventionally propagated plants. The fact that they actually outperform conventionally propagated plants should facilitate economic establishment of commercial plantations that begin to pay a return on the investment at an earlier date than would be the case for conventionally propagated plants.

Figure 2. Growth habit of 'Northblue' blueberry plants propagated by cuttings (*left*) and by *in vitro* methods (*right*).

LITERATURE CITED

1. Damiano, C., W. Faedi, and D. Cobianchi. 1980. Trials on stolon formation in the nursery and agronomic observations on strawberry plants obtained by *in vitro* culture. *Frutticoltura* 42:51–60.
2. Garley, B. S. 1980. Micropropagation of blueberries. MS Thesis, University of Minnesota, St. Paul.
3. Grout, J. M. 1984. Influence of propagation method on the growth habit and propagability of 'Northblue' half-high blueberry. MS Thesis, University of Minnesota, St. Paul.
4. Grout, J. M., P. E. Read, and D. K. Wildung. 1986. Influence of tissue culture and leaf-bud propagation on the growth habit of 'Northblue' blueberry. *Jour. Amer. Soc. Hort. Sci.* 111:372–375.
5. Haghighi, K. 1983. Propagation of Minnesota blueberries through tissue culture. MS Thesis, University of Minnesota, St. Paul.
6. Hartley, C. A. 1986. *In vitro* propagation and field performance of Minnesota half-high hybrid blueberries. M.S. Thesis, University of Minnesota, St. Paul.
7. Lyrene, P. M. 1981. Juvenility and production of fast-rooting cuttings from blueberry shoot cultures. *Jour. Amer. Soc. Hort. Sci.* 106:396–398.
8. Luby, J. J., D. K. Wildung, C. Stushnoff, S. T. Munson, P. E. Read, and E. E. Hoover. 'Northblue', 'Northsky', and 'Northcountry' blueberries. 1986. *HortScience* 21:1240–1242.
9. Swartz, H. J., G. J. Galletta, and R. H. Zimmerman. 1981. Field performance and phenotypic stability of tissue culture-propagated strawberries. *Jour. Amer. Soc. Hort. Sci.* 106:667–673.
10. Swartz, H. J., G. J. Galletta, and R. H. Zimmerman. 1983. Field performance and phenotypic stability of tissue culture-propagated thornless blackberries. *Jour. Amer. Soc. Hort. Sci.* 108:285–290.
11. Zimmerman, R. H. and O. C. Broome. 1980. Blueberry micropropagation. In: Proc. Conf. on Nursery Prod. of Fruit Plants through Tissue Culture—Applications and Feasibility. pp. 44–47. USDA-SEA AGr. Res. Results ARR-NE-11.