Cultivar[a]	Trees[b]	Rating[c]	Cultivar[a]	Trees[b]	Rating[c]
Yellow Newton	2	7	Yugoslavia 6427	3	8
Yellow Transparent	1	9	Yugoslavia 6947	3	7
Perrine Yellow Transparent	2	10	Yugoslavia 6970	2	5
Wrixparent	2	9	Yugoslavia 7060	2	6
York Imperial	1	8	Yugoslavia 7064	1	6
Colora York	1	8	Yugoslavia 7141	1	6
Perrine York	2	9	Zalesak No. 1	1	4
York-a-red	1	3	Zalesak No. 2	1	6
Yorking	1	3	Zalesak No. 3	1	8
Young America	1	9	Zimnieje Piervoskhodnoie	2	4
Yugoslavia 3709	1	4	Zorza	3	2
Yugoslavia 6327	2	10	Zusoff	2	8

A Comparison of the Growth Habit of 'Bergman' and 'McFarlin' Cranberry Cultivars on Commercial Bogs in British Columbia[1]

K. S. TALLMAN AND G. W. EATON[2, 3]

Abstract

Observations were made on the growth habit of 'Bergman' and 'McFarlin' cranberry cultivars, in commercial bogs, during the spring and summer of 1974. The cultivars differed in growth habit in that 'Bergman' produced more uprights on recent runners while 'McFarlin' produced more new uprights on the Growth or on older uprights continued. 'McFarlin' also produced more flowers per upright than 'Bergman'.

The cranberry *(Vaccinium macrocarpon Ait.)* is grown commercially in over 1000 acres (400 ha) of the Fraser Valley of British Columbia. In this area ninety per cent of the acreage is in the cultivars 'McFarlin' and 'Bergman' (Eaton 1970); 675 acres (273 ha) in 'McFarlin' and 275 (111 ha) in 'Bergman' (Thorpe 1972). Although the acreage is not large compared to those in the New England states the yields per acre in British Columbia are often higher.

Bergman (1950) described the cranberry vine as consisting of long creeping stems forming an intertwining mat over the bog. From the stems, uprights arise which bear the flowers and fruits. In a later report, Bergman (1961) distinguished between old uprights (those at least one year old) and new uprights (those in their first year of growth). Old uprights may

[1]This work was supported by a National Research Council of Canada Operating Grant.
[2]The University of British Columbia, Vancouver, Canada, V6T 1W5.
[3]The authors would like to thank Jim Thomas and the staff at Western Peat, Richmond, British Columbia, for their generous assistance and cooperation during the collection of material for this study.

continue their growth for several years. He stated that the total number of uprights and also the proportion of new to old uprights was greatly affected by environmental and cultural conditions, the latter being more important. Hall (1970) found that, when the vine grew in a vertical position, there was continued growth of the existing runner from its apical bud. When the shoot grew horizontally, lateral buds began to develop which eventually became either uprights or runners. Hicks et al. (6) found that shoots from weedy areas were longer than those from pure stands and that the angle of leaf insertion on the stem was greater on the former than on the latter. Pure stands produced six times as many shoots as weedy ones and had more blooming shoots with more flowers per shoot. Roberts and Struckmeyer (1942) found a consistent relationship between the length of growth made by the uprights and the amount of fruit produced. They found optimum growth and maximum production occurred when there were 21.5 to 32.3 uprights per dm^2. With greater density, the uprights were longer and had fewer berries. Between 6.4 and 9 cm of upright growth per year was optimum.

Garlick (1966) in a study of growth, flowering and fruiting characteristics of the cranberry plant compared the average length of uprights of 'Bergman' and 'McFarlin' cultivars. He classified uprights into eight classes according to their flower numbers from zero to seven. In each group, 'McFarlin' uprights were longer than those of 'Bergman'. He found no significant differences between cultivars with respect to either number of uprights or number of flowering uprights.

The purpose of this study was to observe the growth habit of 'Bergman' and 'McFarlin' cultivars and to compare them with respect to the position and number of their fruiting structures. Differences in growth habit may have important effects on productivity.

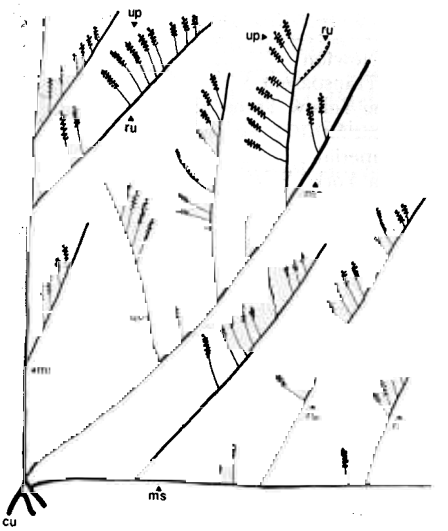

Fig. 1. A 'Bergman' plant. The growth habit is exaggerated for purposes of illustration. More uprights are borne on the runners of the plant than on the main stem. (cu—original cutting, ms—main stem, ru—runner, up—upright).

Materials and Methods

Cranberry plants were collected from two sections of a commercial bog in British Columbia in 1974. The two sections, one 'Bergman' and one 'McFarlin', had been planted in 1968. The collection of intact plants was a difficult task involving untangling vines and careful excavation of portions of the bog. Preliminary observations were used in planning the second phase of the study which involved the collection of data from two other sections of the bog, also of 'Bergman' and 'McFarlin'. These two areas were within a year of each other in age and adjacent to one another.

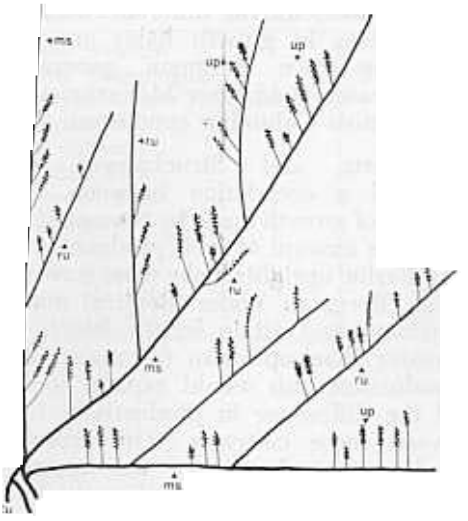

Fig. 2. A 'McFarlin' plant. Many uprights of different ages are borne on the main stem. (Letters as for Fig. 1.)

The bogs were sampled systematically with a 20 x 20 cm quadrat placed at intervals along the length and width of the bog. All uprights and current seasons runners were counted. The uprights and runners were then examined to count the flowers and determine whether the runners and uprights were borne on old wood. Old wood was defined as that formed prior to the previous two growing seasons. New uprights and runners borne on old wood originated at a greater depth in the bog than those that were formed on the previous two years growth. New uprights also had smaller diameter stems and greater distance between nodes.

The variables measured were as follows: number of uprights, number of flowering uprights, number of flowers per upright, number of new uprights growing on old wood, number of new runners, number of flowering runners, number of flowers per runner and number of runners on old wood.

Results and Discussion

The cranberry plant is an evergreen woody vine which may reach a length of several meters in a few years, and consisting of both runners and uprights. 'Bergman' and 'McFarlin' cultivars have essentially the same gross morphology. On a nearly mature bog the basic structures may be described as follows: the original cutting is short with thick branches firmly attached to the bog surface by a mass of roots. The main stem is woody and bears no leaves. It is attached to the ground by roots at intervals along its length. From the main stem runners and uprights arise as branches. The runners have long internodes and bear leaves produced during the previous two or three years' growth. These runners may in turn bear either uprights or new runners. Runners may continue to grow for many years but frequently the growing tip is lost and only lateral branches continue to increase in length. The uprights may branch from runners, the main stem, or other uprights. They grow only a few inches each year and produce leaves spirally which, as on the runners, last for two or three seasons.

'Bergman' and 'McFarlin' differed in the origin of their uprights. Neither cultivar had structures that the other did not have, but 'Bergman' had the greater tendency to produce its crop of uprights on recent runners while 'McFarlin' was more prone to continue growth of older uprights or production of new uprights on old wood (Fig. 1, 2). The uprights apparently grew for two or three years and bore one or two crops. The uprights were then often replaced by newer uprights on more recent wood. 'McFarlin' on the other hand had a large percentage of uprights which continued

to grow in length for a number of years from the terminal bud of an upright of the previous season. Thus 'McFarlin' vines had many uprights originating from the main stem and only a few years younger than the planting itself, as well as uprights of several ages on older runners.

The two cultivars did not differ significantly in the number of uprights, the number of flowering uprights per dm^2, the number of runners produced as current season's growth, or in the number of flowering runners. 'McFarlin' had significantly more new uprights on old wood and a greater number of flowers per upright than did 'Bergman' (Table 1).

Cranberry growth habit can be strongly affected by environment and cultural conditions (2), but the bogs in the present study had been treated in the same manner and were located side by side. Thus the differences observed in growth habit probably represent true cultivar differences. The differences in growth habit are interesting since 'Bergman' generally has greater yield than 'McFarlin' under British Columbia conditions.

Roberts and Struckmeyer (7) showed a correlation between the length of growth made by the uprights and the amount of fruit produced. If 'McFarlin' uprights make more growth than 'Bergman' under identical management and attain length which is greater than optimum for maximum production, this would explain some of the difference in productivity between these cultivars. The present finding that density of the upright stand did not differ significantly between the two cultivars challenges the Roberts and Struckmeyer proposition that a principal factor influencing the growth of uprights is the density of the upright stand.

It is often noted in older plantings that 'McFarlin' bogs appear to be

Table 1. Analysis of variance for cultivar differences in June, 1974.

Variable (per dm^2)	'Bergman'	'McFarlin'	Significance	Variance
Uprights	46.0	46.25	0.9729	113.912
Flowering uprights	8.0	7.50	0.6193	6.942
Flowers per upright	0.74	0.835	0.0015	0.171
Uprights on old wood	5.0	7.75	0.0021	5.18
1974 runners	2.02	2.37	0.4171	1.354
Flowering runners	0.53	0.375	0.3377	0.177
Flowers per runner	0.775	0.850	0.4679	0.153
Runners on old wood	0.125	0.275	0.1324	0.070

Totals for study	'Bergman'	'McFarlin'
Samples	15	15
Uprights	2762	2770
1974 runners	121	142
Flowering uprights	475	446
Flowers	1402	1488

denser than 'Bergman' bogs, although the plants are of the same age. The present investigations, like those of Garlick (4), have failed to show significant differences in the number of uprights per unit area. Thus apparent differences in the thickness of bog cover must reflect a true difference in growth habit. The major reason for this would seem to be the length of the 'McFarlin' uprights and their tendency to be borne on old wood giving a very thick ground cover.

Literature Cited

1. Bergman, H. F. 1950. Cranberry flower and fruit production in Massachusetts. *Cranberries* 15 (4):6-10.
2. ———. 1961. Frost as a factor in cranberry crop production. *Cranberries* 25 (10):7-9.
3. Eaton, G. W. 1970. Cranberry production in British Columbia. *Cranberries* 35 (2):13-14.
4. Garlick, D. H. 1966. The growth and fruiting characteristics of the cranberry. *Unpublished Thesis, Dept. of Plant Science, U.B.C., Vancouver, British Columbia, Canada.*
5. Hall, I. V. 1970. Cranberry shoot morphology as influenced by the orientation of the vines. *Le Naturaliste Canadien.* 97:351-355.
6. Hicks, J. L., Hall, I. V., Forsyth, F. R. 1968. Growth of cranberry plants in pure and in weedy stands under Nova Scotian conditions. *Hort. Research* 8 (2):104-222.
7. Roberts, R. H. and Struckmeyer, E. B. 1942. Growth and fruiting of the cranberry. *Proc. Amer. Soc. Hort. Sci.* 40: 373-379.
8. Thorpe, G. R. 1972. Cranberry production in British Columbia, Canada. *Cranberries* 36 (10):17-18.

The USDA Plant Permit Office Has Moved. After 30 years in Hoboken, N. J., the permit-issuing office has moved to Hyattsville, Maryland. Anyone planning to import plant items from another country should now direct requests for a permit from the USDA to the new office location. The new address is: Permit Unit, USDA-APHIS-PPQ, Federal Building 638, Hyattsville, MD 20782. Phone: (301) 436-8645.

Back Issues of *Fruit Varieties Journal* and *Fruit Varieties and Horticultural Digest.*

Requests for available back issues should be directed to:

American Pomological Society
Dr. L. D. Tukey, Treasurer
103 Tyson Building
University Park, Pa. 16802