Potential use.

'Allstar' is suggested for use in the area from western North Carolina to Missouri and north to southern Illinois and to Massachusetts, where a red stele-resistant, disease-tolerant, productive, large-fruited, late-maturing, firm berry possessing good quality is desired. 'Allstar' can be planted in the spring or summer, and grown for pick-your-own, shipping, home garden or freezing in either matted rows or in hills. It is recommended as an alternative to 'Guardian', 'Delite', and 'Scott' where these cultivars are not satisfactory.

Availability

'Allstar' plants are available to nurseries propagating certified virus-free plants for spring planting in 1982 and will be offered for sale to the public during the dormant season of 1982–1983. Neither the USDA nor the University of Maryland has plants for sale. A limited supply of 'Allstar' plants will be available from the USDA for experiment station testing in the spring of 1982.

Literature Cited

1. Darrow, G. M. 1966. Parentage of United States strawberry varieties. p. 406–416. In: The strawberry — history, breeding and physiology. Holt, Rinehart and Winston, New York.

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'Tribute' and 'Tristar' Everbearing Strawberries[1]

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'Tribute' and 'Tristar' are everbearing strawberry cultivars (*Fragaria* X *ananassa* Duch.) that fruit in spring, summer, and fall (as indicated by the prefix "Tri-"). They are the first everbearing strawberries bred for culture in the eastern United States which combine resistance to red stele root rot, incited by *Phytophthora fragariae* Hickman, with a high degree of tolerance to verticillium wilt, incited by *Verticillium albo-atrum* Reincke & Berth. Their generally consistent good health, productivity, and fruit quality under a number of cultural systems suggest that these cultivars will offer new opportunities to the strawberry home gardener and commercial grower alike.

Origin

'Tribute' (tested as EB60) and 'Tristar' (tested as EB62) came from a cross of EB18 x MDUS 4258 (Fig. 1) made by D. H. Scott at Beltsville, Md., in 1974. From this cross, 1296 seedlings were screened for red stele resistance during the winter of 1974–1975, following inoculation with a mixture of races A^1, A^2, A^3, A^4, and A^6 of the causal fungus, *Phytophthora fragariae*. From 389 resistant seedlings planted at Beltsville in April 1975, Scott and A. D. Draper selected 5 everbearing seedlings in the fall of 1975, among them 'Tribute' and 'Tristar'. The everbearing trait demonstrated by these selections can be traced through EB18 to its parent Cal 65.65-601, supplied to Scott by R. S. Bringhurst of the University of California in 1971, and ultimately to a wild clone of *F. virginiana glauca* (Duch.) Staudt (= *F. ovalis* (Lehn.) Rydb). The wild progenitor was collected by Bringhurst in the Wasatch mountains of Utah south of Salt Lake City, and was crossed and backcrossed several times to cultivated strawberry to develop the recently introduced 'Aptos', 'Brighton', and 'Hecker' day-neutral types of everbearing strawberries (1).

Description and performance

'Tribute' and 'Tristar' have been tested continuously at Beltsville since 1975. Starting in 1978, tissue culture propagation of these clones made possible considerably wider testing due to increased numbers of plants. They have now been distributed widely in the northern half of the United States for testing in matted row and hill culture, following summer and spring planting, and on raised and flat beds. Testing for suitability to home garden culture was conducted by D. H. Scott of Beltsville. Some observations on potential greenhouse culture also were made in Maryland and in New Jersey, during the testing period.

Tristar. Plant size is medium to small; vigor is medium. Leaflets are obovate, sharply serrate, deep grayish green, tending to turn up concavely at the margin. Petioles, leaf lamina, and stolons are pubescent, often densely. Plants runner medium to well after a chilling period, especially when initial blossoms are removed. Roots were resistant to red stele, and as resistant to verticillium wilt as 'Catskill' in greenhouse bench tests. Leaves and crowns are resistant to powdery mildew, *Sphaerotheca macularis* (Wallr. ex Fries), and tolerant to leaf scorch, *Diplocarpon ear-*

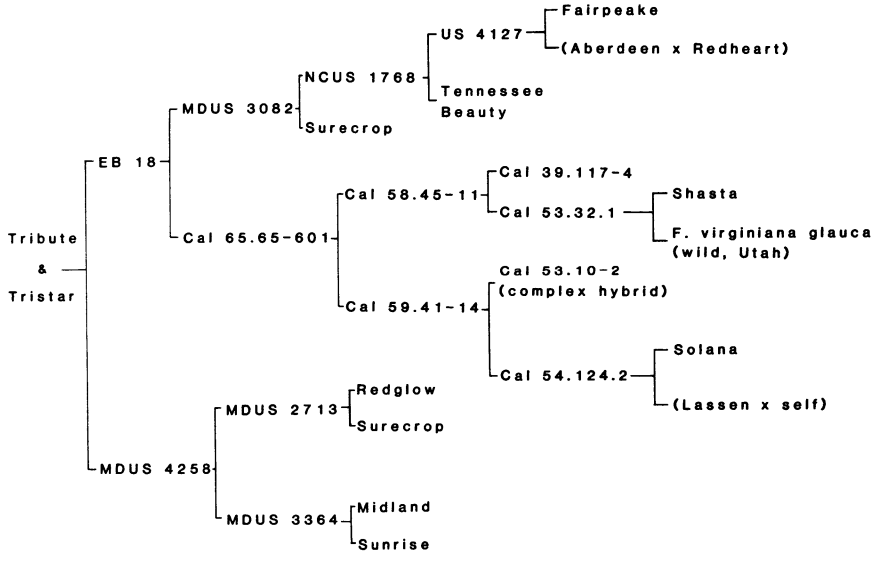

Fig. 1. Pedigree of 'Tribute' and 'Tristar'. 'Tribute' and 'Tristar' are 4th backcross generation (BC_4) plants from the Shasta X *F. virginiana glauca* F_1, with cultivated strawberry being the recurrent parent. Both parents of 'Tribute' and 'Tristar' are resistant to red stele and one, MDUS 4258, is resistant to verticillium wilt.

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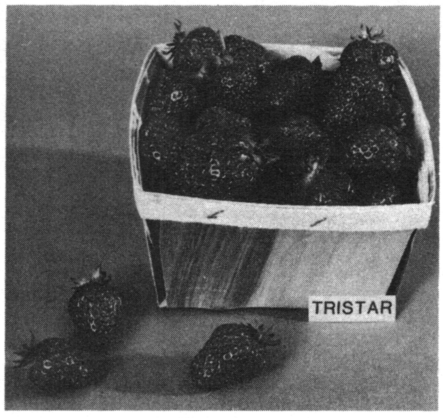

Fig. 2. Quart of 'Tristar' berries, spring, 1981, Beltsville.

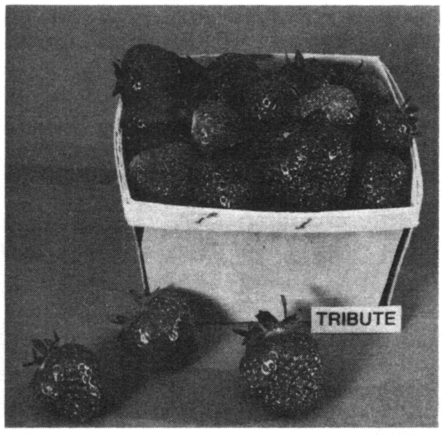

Fig. 3. Quart of 'Tribute' berries, spring 1981, Beltsville.

Table 1. Mean yields and fruit sizes for 4 everbearing and 2 Junebearing strawberry cultivars planted in matted rows at Beltsville in spring of 1979.

Cultivar	Summer & fall, 1979[z] Yield (MT/ha)	Summer & fall, 1979[z] Fruit size (g/berry)	Spring, 1980[y] Yield (MT/ha)	Spring, 1980[y] Fruit size (g/berry)	Total yield (MT/ha)
Tribute	10.8 b[w]	4.7 a	34.6 b	10.2d	45.4
Tristar	15.3ab	5.2 a	23.3 d	7.5f	38.6
Brighton	4.6 c	4.7 a	11.5 f	11.0c	16.1
Hecker	7.4bc	4.2 a	19.7 e	9.0e	27.1
Guardian[x]	---	---	29.3 c	13.6a	29.3
Douglas[x]	---	---	39.9 a	12.4b	39.9

[z]Planted in April, 1979; flowers removed until July 4, harvested from Aug. 1 to Oct. 17, 1979.
[y]Same everbearer plots harvested in the period May 22, 1980–June 13, 1980.
[x]Heavy producing short day or June-bearing clones for comparison; 'Guardian' is a clone from Maryland, 'Douglas' from California.
[w]Mean separation within columns, by Duncan's multiple range test, 5% level.

liana (Ell. & Ev.) Wolf and to leaf blight, *Dendrophoma obscurans* (Ell. & Ev.) H. W. Anderson. 'Tristar' plants bear a heavy, very early spring crop of small- to medium-sized, symmetrical, short conic fruits (Fig. 2) with a marked shoulder and a reflexed cap at maturity. The spring crop tends to ripen uniformly. Fruit flesh and skin are firm. Skin color is a glossy deep red at maturity with the skin pigment reflecting light around the achenes in "star-like" fashion. Internal color is a solid medium deep red, and the flavor is excellent when eaten fresh and unsugared. The summer crops cycle at about 6-week intervals. Fruit size becomes quite small following bloom periods when the soil and air temperatures are high. Fruit shape becomes larger and more elongate in the cooler weather of late summer and early fall.

Tribute. Plant size is medium but vigor is high. The central leaflet is obovate to spherical tending to turn down convexly at the tip. Leaf color is a glossy deep forest green, and the margins are gently rounded serrations, particularly at the apex. Leaf and petiole pubescence is medium. Roots are highly resistant to red stele and tolerant to verticillium wilt infection. Leaves are resistant to powdery mildew and leaf blight and tolerant to leaf scorch. 'Tribute' plants ripen a heavy spring crop at midseason. Fruit shape (Fig. 3) varies from an irregular to a symmetrical short conic wedge with pronounced shoulders. The calyx is generally clasping at maturity with a few calyx points reflexed. Spring fruit size varies from large to medium. Skin color is a glossy bright red, not quite as deep as that of 'Tristar'. 'Tribute' flesh color is a solid medium red. Flavor is acidic but pleasant when consumed fresh and unsugared. Flesh and skin texture is quite firm. 'Tribute' follows summer and fall ripening patterns similar to 'Tristar', but each ripening cycle is somewhat later.

The heavy yielding ability of 'Tristar' and 'Tribute' in matted rows during 2 harvest periods of 11 and 3 weeks, respectively, in 14 calendar months is shown in Table 1. The small average fruit size during the summer and fall months probably can be increased by using larger planting stock, wider plant spacings and timely irrigation and fertilization. Summer fruit size in 'Hecker' was larger, and summer yields were higher for 'Brighton', 'Tribute', and 'Tristar' in the double hill system than in comparable matted rows. However, spring yields were higher in matted rows than in double hills, except with 'Brighton', which yielded the same in both cultural systems. The lower yields of 'Brighton' and 'Hecker' can be attributed largely to foliage injury and loss due to severe infection of leaf blight. 'Tristar' produced a higher proportion of its yearly crop in the summer than did the other 3 everbearers. 'Tristar' produced more of its crop in the summer than in the spring when grown as hills (single plants). 'Tribute' and 'Brighton' also showed a shift toward more summer production when grown as hills compared to matted rows.

Area of Adaptation and uses

The area of potential adaptation has not yet been completely established. 'Tristar' and 'Tribute' have given successful summer and spring crops in Blacksburg, Va.; Beltsville and Silver Spring, Md.; Wattsburg, Pa.; Wooster, Ohio and Arlington, Wis. Their ability to persist and fruit cyclically without chilling under greenhouse conditions, and their hardy Rocky Mountain strawberry ancestry suggests that they may be adapted to the upland areas of the south, the eastern United States in all but the coldest areas, and the mild Pacific Northwest as home garden, local market, and pick-your-own operations where repeat fruiting, red stele resistance, and high productivity is desired. Consequently, 'Tribute' and 'Tristar' strawberries are suggested for trial in all areas, even though their response to all environments is not fully predictable, because their fruiting habit permits cultural flexibility so that periods of temperature and disease stresses may be avoided.

Availability

Plants of 'Tribute' and 'Tristar' will be available to nurseries propagating certified virus-free plants for spring planting of 1982 and to growers in 1983. Neither the USDA nor the University of Maryland has plants for sale.

Literature Cited

1. Bringhurst, Royce S. and Victor Voth. 1980. Six new strawberry varieties released. Calif. Agr. 34(2):12–15.
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