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Co. 1 Tapioca : An Improved Strain

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The intensive selection programme at the Tamil Nadu Agricultural University has resulted in the release of a promising strain, Co. 1 Tapioca. The salient features of the strain are (1) shorter duration of 8½ to 9 months, (2) the high starch content of tubers with 35 per cent giving total out turn of 10.33 tonnes of starch per hectare. (3) An average yield of 29.97 tonnes of tubers per hectare with a range of 29.90 to 36.50 tonnes. The mean increase in yield over local is by 16.2 per cent. The yield could be increased by 20.1 per cent by closer spacing of 75 x 75 cm than the normal spacing of 75 x 90 cm, (4) the clone records very low incidence of mosaic virus ranging from 0 to 8 per cent when compared to 40 to 100 per cent in other clones, and (5) the HCN content of tubers is very low compared to other clones and hybrids i. e., 10 μg/g in the flesh and 185 μg/g in the rind.

The area under tapioca in Tamil Nadu is on the increase and there is need for high yielding varieties with better plant type and good quality tubers. Previously, the clones Malavella and Anaikomban were recommended for cultivation. In addition, several clones are under cultivation in different parts of Tamil Nadu. Some of them are Malayan 4, Burma, Malabar, Kalikalan and others with a variety of local names. But all are susceptible to mosaic virus with low to medium starch content in the tubers. With the objective of evolving a variety with high yield potential and better quality tubers suited for Tamil Nadu, selection programme was intensified at the Tamil Nadu Agricultural University. This resulted in the release of the new strain Co. 1 tapioca, and the information on the strain is presented in this paper.

MATERIALS AND METHODS

The germplasm clones maintained at the Department of Horticulture, Tamil Nadu Agricultural University, numbering 92 were screened from 1972. Among them, six clones were earmarked as promising with regard to yield and quality. They were ME. 7 (a Trichy local type Tamil Nadu), ME. 1 (Malayan 4), ME. 4 (Malavella), H. 97, H. 165 and H. 226. The latter three clones were hybrids, received from Central Tuber Crops Research Institute, Trivandrum. These clones were raised in replicated trials adopting a plot size of 5 x 7m. The recommended cultural practices (Muthukrishnan *et al.*, 1964) were followed. Observations were recorded on the yield of tubers (number and weight), duration of crop, incidence of mosaic virus and starch and HCN

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contents of tubers. The spacing requirements of clones ME. 7, H. 97, H. 165, and H. 226 were also studied in a replicated trial with two spacings viz., 75 x 75 and 76 x 90 cm. The starch content of tubers was estimated as per the method of Mc Gready *et al.* (1950). The HCN content was assessed in the rind and flesh as suggested by Indra and Sinha (1969). Among the six, four clones viz., H. 226, ME. 1, ME. 4 and ME. 7 were advanced and tested in multilocation trials in four Research Stations and in 39 farmers holdings of Tamil Nadu representing different agroclimatic regions. The tubers were subject to organoleptic scoring.

RESULTS AND DISCUSSION

The results of four years data have indicated that the clone H. 165 recorded a mean yield of 31.62 tonnes of tubers per hectare, which was 28.24 per cent increase over the popular clone, Malavella (Table I). This was followed by ME. 7 with 29.51 tonnes of tubers per hectare accounting for 16.60 per cent over ME. 4 (Malavella) and both H. 165 and ME. 7 were on par statistically. The clone ME. 7 also recorded higher yields of tubers at Agricultural Research Station, Aliyarnagar, Agricultural Research Station, Bhavanisagar and Fruit Research Station, Periyakulam and the increased yield ranged from 10.4 to 21.1 per cent over ME. 4. The yield differences were significant statistically.

Regarding the crop duration, the clone ME. 7 was promising with the lowest crop duration of 8½ to 9 months followed by clone H. 165 with a

TABLE I. Comparative Performance of Tapioca Clones at Research Stations (Yield - tonnes/ha)

Places and Seasons	Varieties						Sig. by 'F' test	S.E.	CD (P= 0.05)
	H.97	H.165	H.226	ME.1	ME.4	ME.7			
Department of Horticulture, TNAU, Coimbatore.									
1972-73 (June-March)	—	—	29.25	—	26.21	28.24	Yes	0.67	1.92
1972-73 (October-July)	—	—	27.63	—	24.97	30.88	Yes	0.85	2.32
1973-74 (October-July)	26.85	34.90	31.94	23.36	26.90	32.26	Yes	0.91	2.66
1974-75 (October-July)	20.16	28.34	24.12	19.12	23.20	26.65	Yes	0.81	2.32
Mean of 4 years	23.50	31.62	28.24	21.42	25.32	29.51	Yes	1.02	3.18
% on Malavella	92.80	124.90	111.60	84.60	100.00	116.60			
Agricultural Research Station, Bhavanisagar.									
1973-74 (August-May)	—	—	32.81	27.62	30.12	36.50	Yes	1.21	3.52
1974-75 (May-February)	—	—	29.27	24.84	28.32	31.82	Yes	0.91	2.62
Mean of 2 years	—	—	31.14	26.23	29.22	34.19	Yes	1.02	2.99
% on Malavella	—	—	106.60	98.80	100.00	117.00		1.02	2.99
Agricultural Research Station, Aliyarnagar.									
1972-73 (October-June)	—	—	28.34	21.16	26.52	32.12	Yes	1.26	3.61
% on Malavella	—	—	106.80	79.80	100.00	121.10			
Fruit Research Station, Periyakulam.									
1973-74 (October to July)	—	—	27.18	20.21	25.60	28.26	Yes	1.06	3.21
% on Malavella	—	—	106.20	78.50	100.00	110.40			

TABLE II. Overall Performance of Tapioca Clones

Particulars	Varieties					
	H.97	H.165	H.226	M.4	Malavella	M.E.7
Mean yield (tonnes/ha) (Mean of all trials)	23.50	31.62	28.73	22.26	25.78	29.97*
% increase or decrease over Malavella	—8.90	+21.60	+11.50	—13.70	—	+16.20
Duration (months)	10.00	9.10	10.00	10.00	10.00	8½-9
Mean incidence of mosaic (%)	8.90	15.20	26.20	16.20	45.20	5.40
Starch (%) on fresh wt. basis	25.20	30.00	22.50	20.00	20.50	35.00
Starch yield (tonnes/ha)	5.92	9.45	6.49	4.52	5.26	10.33
Organoleptic scroing (%)	73	75	72	75	70	84

duration of 9 to 10 months. The other clones had a longer duration of 10 months (Table II).

The incidence of mosaic ranged from 0 to 45.2 per cent in the different clones (Table II). Among them, the clone ME 7 recorded the lowest mean infection of only 5.4 per cent with a range of 0 to 8 per cent. The incidence of mosaic virus in other clones ranged from 8.9 per cent in H. 97 to 45.2 per cent in Malavella.

The tubers of the clone ME. 7 had the highest starch content of 35 per cent on fresh weight basis while it ranged from 20.5 to 30.0 per cent in other clones (Table II). The higher starch content in the clone ME. 7 had been reported earlier by Dharmalingam *et al.* (1973) while evaluating 24 clones under Coimbatore conditions. The estimated yield of starch per hectare worked out to 10.33 tonnes compared to 4.52 to 9.45 tonnes in other clones.

The quality of the tubers was assessed by the HCN content. The clone ME.7 had the lowest HCN content of 10 μg/g in the flush (range 9 μg/g to 21 μg/g) and 185 μg/g in rind (range 100 μg/g to 215 μg/g) (Dharmalingam *et al.* 1973). The consumer appeal of the clone ME. 7 was of a high order with 84 per cent scoring in the organoleptic tests compared to 70 to 75 per cent in other clones.

Though the clone H. 165 yielded on par with the clone ME. 7, it lacked the other characters. The clone ME. 7 not only recorded higher tuber yield but also had other favourable attributes like shorter crop duration, tolerance to mosaic virus, higher starch content and low HCN content. The clone ME. 7 was advanced to multilocation trials in 39 farmers holdings distributed in the different districts of Tamil Nadu. In these trials also superiority of the clone was maintained and a mean tuber yield of 25.75 tonnes of tubers was recorded accounting for 15.75 per cent increase over the local clones under cultivation (Table III).

The clone H. 165 and ME. 7 re-

TABLE. III Performance of M. E. 7 tapioca in Farmers' Holdings (Yield - tonnes/ha)

District	No. of holdings tested	M. E. 7	Local	% increase over Local
Coimbatore	8	34.00	25.70	32.3
South Arcot	10	23.20	21.60	7.4
Madurai	4	24.40	22.00	10.9
Tirunelveli	4	25.40	23.20	9.5
Salem	6	22.90	19.80	15.7
Kanyakumari	5	26.52	23.18	14.4
Tiruchirapalli	2	23.81	21.32	11.7
Mean	39	25.75	22.26	15.7

corded higher yields of 31.62 and 29 51 tonnes of tubers per hectare, which were on par statistically (Table III). The possibility of further yield increase in the clone ME. 7 was explored. The plants being less vigorous and occupying less space, offered scope for a higher plant density per hectare. The yield could be increased by adopting a closer spacing of 75x75 cm. The increased yield was 20.1 per cent over the normal spacing of 75 x 90 cm followed for all the cultivars. The additional income by higher plant density was Rs. 2,180/= per hectare. The size and quality of tubers were not affected by closer spacing.

Considering the superiority of the clone ME. 7, higher yield of tubers, higher starch and low HCN content of tubers and tolerance to mosaic virus, it was released as Co. 1 tapioca.

DISTINGUISHING CHARACTERS

The plants are medium vigorous. The young stem is dark green and the matured stem greyish green in colour. The emerging shoots and petioles are pink. The tubers are medium sized with whitish brown skin, cream rind and white flesh. The taste of raw and cooked tuber is non-bitter.

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