

## Growth and Yield of Watermelon as Influenced by Grafting

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**Abstract:** The study was conducted to determine the effect of grafting on the growth, yield and control of wilt disease of watermelon. Grafting of watermelon on bottle gourd root stock significantly reduced the wilt disease in the field. Grafting also produced higher number of fruits per plant (5.25) and larger fruit (30.30 cm) which ultimately produced higher yield (56.92 t/ha<sup>-1</sup>) than non grafted plants. The grafts produced 3.5 times higher yield than non grafts.

**Key words:** Watermelon, grafting, *Fusarium* wilt

### Introduction

Watermelon (*Citrullus lanatus*) is an important and delicious fruit in Bangladesh. It appears first in the market during spring and refreshes everybody during hot season. Commercial cultivation of watermelon is concentrated in the district of Chittagong, Rajshahi, Natore, Jessore and Comilla (BBS, 1998) and it is considered as profitable crop to the growers of those areas. But now a days the growers feel discouraged in watermelon cultivation due to wilt disease, which results in the reduction of area and production of this important crop (BBS, 1998). In the recent years grafting of watermelon on other cucurbit rootstocks are popularly practicing in the developed countries to overcome this problem. Taher and Umekawa (1981) reported that *Fusarium wilt* caused by *Fusarium oxysporum neviium* can not attack other cucurbit except watermelon. Ahmed *et al.* (1987) also suggested to use bottle gourd as rootstock for watermelon grafting to avoid wilt disease of watermelon. Considering the above facts, the present experiment was undertaken to determine the influence of grafting on the growth and yield of watermelon.

### Materials and Methods

The experiment was carried out at the Agricultural Research Station, Pahartali, Chittagong during the period from August to December 1998. The popular watermelon variety "Top Yield" was used in this study. Watermelon graft on bottle gourd rootstock and watermelon seedling were used as the treatment of the experiment. The field experiment was laid out in randomized complete block design. Bottle gourd and watermelon seeds were sown in the prepared seed bed on 1st August 1998 for raising rootstock and scion for grafting. Approach grafting technique was followed as suggested by Ahmed *et al.* (1987). The grafting operation is done at the opening stage of first true leave of both the stock and scion on August 9, 1998. The grafted plants were kept in a humidity chamber prepared by polyethylene film covered with gunny chat to make a condition warm, moist and low light intensity. Hardening of the grafts after union was done for 10-15 days before field plantation. The grafts were planted in prepared bed with 2m apart on the August 31, 1998. For control treatment watermelon seedling of same age were prepared in poly bag and transplanted on the same day. The crop was fertilized with

10,000, 250, 100, 200 kg of cowdung, urea, TSP and MP respectively. Full quantity of cowdung, TSP and MP applied in the pit. Urea as top dressed in three equal splits and applied at 15, 30 and 45 days after planting. Other intercultural operations were done as and when necessary. Data on different growth and yield parameters were collected and analyzed as per standard statistical procedure as suggested by Gomez and Gomez (1984). Percentage of wilted plants were presented on total plant basis.

### Results and Discussion

The result showed that the growth of the vine and flowering behaviour was not significantly influenced by grafting (Table 1). However, both the length of vine and number of lateral branches produced in the grafted plants were higher than those of the non-grafts. The root system of bottle gourd is much pronounced than that of watermelon which might facilitate the uptake of more nutrient resulting better growth of the grafted plant. Similar comments were made by Iwanaga *et al.* (1982). Result regarding the node order of 1st male and female flower reveals that the non graft produced both the male and female flower on the lower node than that of the grafted ones.

Similarly the earliest flowering was observed in the watermelon seedling and the grafted plants were late flowering. The growth of watermelon was interrupted in the early stage due to grafting injury which might causes the delay in flowering. Number of fruit per plant, fruit length, percent of wilted plants in the field and the yield of watermelon was significantly influenced by the grafting. The weight of individual fruit was not influenced by grafting operation. However, fruit produced in the grafted plants were heavier in weight than that of nongrafts. Significantly highest number (5.25) of fruits/plant was obtained from grafted plants. This might be due to the higher vegetative growth of the plants in the grafts.

The total soluble solid percent (TSS%) of fruit produced in the grafted plants were significantly higher than that of nongrafts (Table 2). Georgiew (1973) and Ahmed *et al.* (1987) also reported that brix percent of watermelon was higher when grafted on squash and bottle gourd, respectively than the control (non-graft). The yield of fruit per plant in the grafted was significantly higher than that of non-graft. The higher yield per plant in the grafted plant was mainly contributed by higher number of fruit per plant

Table 1: Growth and flowering behavior of watermelon as influenced by grafting

Treatments	Length of main vine (m)	No. of lateral vine	Days to anthesis 1st male flower (DAT)	Node order of 1st male flower	Days to anthesis 1st female flower (DAT)	Node order of 1st female flower	% of wilted plants
Non-grafted	4.32	3.67	36.00	16.37	46.00	30.37	43.33
Grafted	5.72	3.71	41.00	20.59	50.00	29.67	3.33
LSD (5%)	NS	NS	NS	NS	NS	NS	24.83
CV (%)	8.68	3.03	5.83	7.95	4.92	4.05	30.30

Ns = Non significant

Salam *et al.*: Performance of grafted watermelon

Table 2: Yield and yield components of watermelon as influenced by grafting

Treatments	No. of fruit/plant	Wt. of single fruit (kg)	Fruit length (cm)	Fruit circumference	% TSS	Yield (t ha <sup>-1</sup> )
Non-grafted	3.33	3.37	27.07	56.53	10.20	16.35
Grafted	5.25	4.54	30.30	57.09	12.50	56.92
LSD (5%)	1.85	NS	2.65	NS	1.89	4.14
CV (%)	12.34	14.52	2.63	3.07	4.74	3.23

NS = Non Significant

TSS = Total soluble solid

and fruit weight. The percentage of plant died due to wilting and the yield per hectare of watermelon are also presented in Table 1. It was observed that 43.33 % of non-grafted plant in the field was died against only 3.33 % of grafted plants. Ahmed *et al.* (1987) also reported that 2 % plants were affected by acute wilting from watermelon grafted on bottle gourd. The yield of watermelon per hectare was significantly influenced by grafting. Significantly highest yield of fruit (56.92 t ha<sup>-1</sup>) were harvested from the grafted and plant which were 350 percent higher than that of the nongraft. It was revealed from the result that the grafting of watermelon on bottle gourd produced encouraging result and by adopting this techniques, the grower can save their crop from wilt disease.

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