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GROWTH OF CHILLI (*CAPSICUM ANNUUM* L.) F_1 HYBRID SKY LINE-2 IN RESPONSE TO DIFFERENT AGES OF TRANSPLANTS

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Abstract
The research was conducted during 2004-2005 to observe the influence of different age of transplants on the growth of chilli F_1 hybrid Sky Line-2. Ages of transplants had no significant effect on mortality percentage and root dry weight per plant. Plant height at first flowering and maturity, number of days taken to flowering, number of leaves and number branches per plant at maturity, foliage fresh and dry weight per plant and root fresh weight were affected by various ages of transplants. Fifty days old seedlings exhibited best growth in terms of plant height, number of branches, number of leaves per plant, foliage fresh and dry weight and root fresh per plant.

Keywords: Age, chilli (*Capsicum annuum* L.), growth, transplants.

INTRODUCTION
Chilli (*Capsicum annuum* L.) is third most important crop of family sloanaceae after potato and tomato. In Pakistan, chillies are grown on large scale as a cash crop, occupying the largest area after potato and onion [Anonymous 2000]. Chilies are being grown on an area of 62 thousand hectares with annual production of 131 thousand tones [Anonymous 2005].However per hectare yield of chillies is quite low in Pakistan as compared to other agriculturally advance countries.

Chilli is a summer vegetable and grown in southern Punjab and Sindh, Pakistan. It is generally recommended that 4-8 weeks old seedlings are transplanted when they are about 15-24 cm in height. The effect of transplant age on yield is an issue often investigated by growers to maximize production potential. Amongst various factors affecting the yield are, lack of high yielding cultivars, supply of inadequate amount of farm yard manure, application of chemical fertilizers and finally lack of knowledge about transplanting time and age of transplants. The research work done in other countries shows that both growth and yield in chillies are markedly influenced by differentially aged chilli seedlings and transplanting date. Lee *et al.* [2001] reported that seedling growth of chillies was greater with increasing age of transplants. They concluded that plant height, dry weight and the number of branches increased with seedling age. Present research project was therefore, envisaged to evaluate best age of transplants of chilli F_1 hybrid Sky Line-2 under Punjab plain conditions especially Multan.

MATERIALS AND METHODS

The experiment was conducted at the Agriculture Farm of the University College of Agriculture, Bahauddin Zakariya University, Multan during 2004-2005. Total area under experimental use was 4470 x 1080cm and net plot measured 390 x 330cm. The experiment was laid out in a Randomized Complete Block Design with three replications. Seeds of hybrid chilli F_1 Sky Line-2 were taken from grain market, Multan, which had been imported from Korea. Chilli nursery was sown on 10th January 2004. Seedlings of different ages like 40, 50, 60, 70 and 80 days old were transplanted in well prepared raised beds, one meter apart and plant to plant distance was 37.5 cm. Water was applied immediately after transplanting. The field was fertilized at the rate of 100 kg N, 80 kg P and 40 kg K ha^{-1} [Baloch *et al*. 1989]. The entire phosphorus, potash and half of the nitrogen was applied at the time of transplanting, while the remaining half of the nitrogen was given after one month of transplanting. A basal dose of 25 tonnes ha^{-1} of well-rotted FYM per hectare was applied one month before transplanting. Cultural practices were carried out according to the crop requirements. Data were collected on following growth parameters such as mortality percentage of transplanted seedling, number of days taken to flowering, plant height at first flowering and maturity (cm), number of branches and leaves per plant at maturity, foliage fresh and dry weight per plant at maturity and root fresh and dry weight per plant at maturity (g). Data collected were analyzed statistically by using "Analysis of Variance" techniques and treatment means were subjected to Duncan's New Multiple Range Test for comparison at 5% probability level [Peterson 1994].

RESULTS AND DISCUSSION

MORTALITY PERCENTAGE

Mortality percentage in chilli F_1 Sky Line-2 was non-significantly different for different transplant ages (Table 1). Forty days old transplants showed high mortality whereas, minimum mortality was observed in 70 days old transplants. These results agree with the findings of Leskovar *et al*. [1991]. They concluded that well-established root system of older seedlings show better survival as compared to younger seedlings. Young seedlings might not bear the transplanting shock.

NUMBER OF DAYS TAKEN TO FLOWERING

It is clear from Table 1 that number of days taken to flowering is significantly affected by different transplant ages and transplanting time. Eighty days old seedling took minimum number of days to flower (32.33 days) followed by 60 days old seedlings, whereas 40 days old seedlings took more number of days to flower. It could be due to temperature effect because transplanting time was different for all the transplants. These results agree with the findings of Rahman and Quasem [1986]. They concluded that numbers of days to flowers are associated with increased age of transplants.

PLANT HEIGHT AT FIRST FLOWERING

Plant height at first flowering was significantly affected by various ages of transplants. Eighty days old seedling produced maximum plant height (21.77cm)

followed by 70 and 40 days old seedlings, whereas minimum plant height (17.67cm) was recorded in 60 days old seedlings. These results disagree with the findings of Leskovar *et al*. [1991]. They concluded that this might be due to better-established root system of older seedlings as compared to younger seedlings. The better-established root system could be considered for better performance of the plants.

Table 1: Effect of different ages of transplants on the growth of chilli F_1 hybrid Sky Line-2.

Treatments	40days old seedlings	50days old seedlings	60days old seedlings	70days old seedlings	80days old seedlings
Root dry wt. per plant at maturity (g)	14.13a	14.43a	14.13a	12.93a	8.700a
Root fresh wt. per plant at maturity (g)	18.30b	27.90a	24.40a	25.50a	14.97b
Foliage dry wt per plant at maturity (g)	85.70b	121.0a	24.33c	27.97c	15.00c
Foliage fresh wt. Per plant at maturity (g)	168.6b	295.4a	77.80c	68.50c	53.50c
No. of leaves per plant at maturity	3410b	8293a	1246c	1050c	562.6c
No. of branches per plant at maturity	11.07ab	12.37a	11.00ab	9.300b	6.430c
Plant height at maturity (cm)	73.00b	76.80a	72.47b	60.97c	58.73c
Plant height at first flowering (cm)	20.50ab	19.20bc	17.67c	21.17ab	21.77a
No. of days taken to flowering	60.33a	45.00c	58.33b	36.67d	32.33e
Mortality percentage	4.100a	2.770a	2.630a	1.300a	3.330a

PLANT HEIGHT AT MATURITY

Plant height at maturity was significantly different in all the treatments (Table 1). Fifty days old seedlings produced maximum plant height (76.80cm) followed by 40 days old seedlings, which produced 73.00cm and 72.47cm plant height. Seventy and 80 days old seedlings showed minimum plant height 60.97cm and 58.73cm, respectively. Plant height at maturity showed opposite results to plant height at first flowering, whereas 80 days old seedlings produced maximum plant height at first flowering. Here it could be hypothesized that temperature for younger seedlings was quite suitable for their good growth but when old

seedlings were transplanted the temperature was somewhat high, which may not be suitable for good growth. It should be thought that when old seedlings (70 and 80 days) were transplanted they flowered earlier and they had little time to make satisfactory growth which younger ones had attained already.

NUMBER OF BRANCHES PER PLANT AT MATURITY

Various transplant ages had a significant effect on number of branches per plant at maturity (Table1). Maximum number of branches (13.37) were found in 50 days old transplants whereas 80 days old seedlings produced minimum number of branches (6.43). These results agree with the findings of Shin *et al*. [1999]. These results could also be explained that in such a way that the chilli plants might be enforced to stop their growth at particular level of temperature. It means that old seedlings, which were transplanted later than younger ones, faced high temperature and could not produce maximum number of branches. So, it could be hypothesized that growth of chillies depends on temperature or transplanting time.

NUMBER OF LEAVES PER PLANT AT MATURITY

Numbers of leaves per plant at maturity showed highly significant results for age of transplants (Table 1). Maximum number of leaves was observed in 50 days old seedlings (8293), and 80 days old seedlings produced minimum number of leaves (562.6). These results are in line with the results of Shin *et al.* [1999].

FOLIAGE FRESH WEIGHT PER PLANT AT MATURITY

Foliage fresh and dry weight per plant show significant differences for different ages of transplant. Maximum fresh weight (295.4g) and dry weight (121.0g) was recorded in 50 days old seedlings, whereas minimum fresh weight (53.50g) and dry weight (15.00g) was observed in 80 days old seedlings.

ROOT FRESH AND DRY WEIGHT PER PLANT

Root fresh weight shows significantly difference for different ages of transplants. Maximum root fresh weight (27.90g) was recorded in 50 days old seedlings, whereas 80 days old seedlings produced minimum dry weight (14.97g). As for as root dry weight was concerned, there were non-significant differences in root dry weight per plant for different ages of transplants. Maximum root dry weight was observed in 50 days old seedlings, whereas minimum weight was found in 80 days old seedlings. These results are not in conformity with the findings of Shin *et al*. [1999].

CONCLUSION

It can be concluded from all parameters that 50 days old seedlings exhibited best growth in terms of plant height, number of branches, number of leaves per plant, foliage fresh and dry weight, root fresh and dry weight per plant.

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