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Effect of Depodding on The Growth and Yield of Peas (*Pisum sativum* L.)

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Abstract: Present studies were carried out to find the effect of removal of reproductive parts i.e. pods and to observe the compensatory growth behavior and lateral bud out growth for source sink relationship of pea plants. Deponing greatly increased the height of plant, number of leaves, number of branches and number of flowers per plant. Seed number per pod, number of seeds per plant, mean seed weight, total biomass and harvest index was also found significantly affected as a result of pod removal. However, pod removal had no significant effect on branch length number of pods per plant and seed weight per plant.

Key words: Peas, depodding, source-sink relationship, growth, yield

Introduction

Pea (*Pisum sativum* L.) is one of the prominent vegetable crops grown in Pakistan. It is also an important cash crop of the Punjab province and plays a major role in the farm economy. The pea crop ranks fourth in the worldwide production amongst grain legumes after soybean, groundnuts and French beans. Peas are cultivated over an area of 833 thousand hectares with a total production of 6878 thousand metric tons, in the world. In Pakistan area under peas is 10000 hectares giving annual production of 72000 metric tons (Anonymous, 1998). Peas are liked much for their high nutritive values especially proteins and for this reason the area under the crop has been increasing day by day. But, unfortunately, the yield per hectare is very low as compared to other advanced countries.

Depodding is a technique which changes pace of growth by altering the source sink balance of the plant and results in accelerated vegetative growth ultimately producing greater number of flowers and increasing the seed production of the crop, hence yield is improved. Lauer and Shibles (1987) reported that in soyabean some types of sink reduction treatment had been found to increase the plant size and number of branches was also upgraded. Levitt *et al*. (1987) showed that in field beans depodding promote flower and pot number. Nooden and Guiamet (1989) reported that in soyabean reproductive sink reduction treatments had a variable effect on leaf number and growth of lateral branches.

Qazi and Caesar (1989) reported that in peas, removal of floral buds resulted in highly significant increase in accumulation of dry matter. Removal of 10-15 days old pods increased the total number of pods and dry matter per plant. Kwapata and Hall (1990) reported that flower and pod removal can be regarded as a treatment that reduces sink size and thus alter the source sink balance of the plant. In certain conditions the crops are able to compensate for the removal of flowers and pods. Continuous flower and pod removal from compea plants have been reported to prevent plants senescence and delay maturity. Aufhammer and Gotz-Lee (1991) revealed in field beans that removal of basel inflorescence increased pod set and seed weight at remaining nodes especially at the lower ones. Gwathmey *et al*. (1992) showed that in compea, pod removal changed the reproductive pattern of senescent genotype. Picking had a little influence on the number of pods produced during the first pod set. Pod removal, affected the vegetative growth, which resulted to increase the number of branches as well as they increase in their length. However, the leaf size remained unchanged. Molsminkle (1993) showed that removal of flowers and pods at initial stages of pod set was much helpful to attain the proper plant size, thus ultimately the pod size and seed number increased giving a better production. Schulz (1994) in experiments on peas showed that manipulation of the sink indicated that translocation of pea seedlings is sink regulated and responded to increase in total biomass. Keeping in view the above facts, present project was envisaged to evaluate the effects of depodding on growth and yield of peas.

Materials and Methods

The research studies were conducted in the vegetable experimental area, Department of Horticulture, University of Agriculture, Faisalabad during 1997. Peas cultivar, knight, was selected for sowing in October and harvested in January. There were four replications for each treatment. Various treatments were as under:

T1 = Control
T2 = Alternate pods were removed
T3 = A set of three pods was alternately removed starting from first pod
T4 = All pods were removed
T5 = A set of three pods was alternately removed starting from the 4th pod

After germination till harvesting the data were recorded for all the characters on weekly intervals except number and weight of seeds, total biomass and harvest index for which the data were collected after harvesting. The experiment was laid out according to the RCB design and treatment means were compared by using DMR test according to the method described by Steel and Torrie (1980) compared treatment means.

Results

Highly significant results were observed for most of the parameters as a result of treatments except length of branches, number of pods per plant and seed weight per plant which were found unaffected with the treatments. The significant parameters are discussed as under.

Height of plant (cm): Table 1 depicts highly significant results. Treatment where all pods were removed gave the maximum height and a set of three pods was alternately removed starting from the 4^{th} pod with minimum plant height. All the treatments except where all pods were removed were similar and no statistical difference could be located among them.

Table 1: Effect of depodding on the growth and yield of peas (*Pisum sativum* L.)

Treatments	1	2	3	4	5	6	7	8	9	10	11	12
T1	31.66b	9.00b	1.49b	11.25a	11.50a	6.58a	8.530b	56.55c	13.230a	0.236b	23.90b	0.5550a
T2	33.16ab	10.66a	1.63a	13.74a	13..75a	7.82a	8.472b	66.62a	15.575a	0.233b	32.21a	0.4822b
T3	31.83b	10.41a	2.60a	13.99a	13.99a	7.66a	8.907a	68.26a	15.560a	0.227b	31.98a	0.4850b
T4	36.49a	11.25a	2.74a	12.57a	12.58ab	7.58a	8.545b	64.75b	17.944a	0.300b	32.03a	0.4653b
T5	30.91b	10.16ab	2.35a	12.16a	12.16ab	7.49a	8.838a	66.25a	15.546a	0.232b	31.23a	0.4940b

1 = Height of plant(cm); 2 = No. of leaves per plant; 3 = No. of branches per plant; 4 = Length of branches per plant; 5 = No. of flowers per plant; 6 = No. of pods per plant; 7 = No. of seeds per pod; 8 = No. of Seeds per plant; 9 = Seed weight per plant (g) 10 = Mean seed weight (g); 11 = Total biomass 12 = Harvest index. *Values sharing same letters don't differ at 0.05 probability level

Number of leaves per plant: Treatment where all pods were removed superceded all other treatments (Table 1) by producing 11.25 leaves although it was statistically similar to treatment where alternate pods were removed and a set of three pods was alternately removed starting from first pod. Lowest number of leaves was observed in where a set of three pods was alternately removed starting from the 4th pod yet it was better than control.

Number of branches per plant: Treatment where all pods were removed maintained its supremacy over all treatments by producing 2.74 branches per plant (Table 1). Control produced the lowest number of branches. Other treatments use statistically alike to treatment where all pods were removed.

Number of flowers per plant: Table 1 reveals highly significant results. Treatment where a set of three pods was alternately removed starting from first pod produced highest number of flower although it was statistically similar to treatment where alternate pods were removed. Lowest number of flower was noted in control whereas treatments where all pods were removed and a set of three pods was alternately removed starting from the 4th pod found better than control and occupied the middle position.

Number of Seeds per pod: Highly significant results were obtained for this factor of study as is evident from Table 1. When a set of three pods was alternately removed starting from first pod produced highest seeds per pod, however it was statistically similar to where a set of three pods was alternately removed starting from the 4th pod. Other treatments behaved similar as that of control.

Number of seeds per plant: Treatment where a set of three pods was alternately removed starting from first pod produced the highest number of seeds per plant which was found similar statistically to treatments where alternate pods were removed and a set of three pods was alternately removed starting from the 4th pod. Treatment where all pods were removed produced the lowest number of seeds from other treatment yet it was better than control.

Mean seed weight (g): Treatment where all pods were removed produced the maximum mean seed weight as is clear from Table 1. All other treatments including control behaved alike statistically.

Total Biomass: Table 1 advocates highly significant results for various treatments as compared with control. Depodding at different levels showed similar results for increase in total biomass. However treatment where alternate pods were removed produced huge total biomass but statistically it was similar to Treatments where a set of three pods was alternately removed starting from first pod, all pods were removed and a set of three pods was alternately removed starting from the 4th pod. Control produced the lowest total biomass.

Harvest Index: Table 1 reveals significant, results as compared to control. In control, harvest index was maximum as compared to all other treatments which were statistically similar with a slight difference and they appeared in ascending order from treatment where a set of three pods was alternately removed starting from the 4th pod, a set of three pods was alternately removed starting from first pod, alternate pods were removed to all pods were removed.

Discussion

Various treatments of pod removal were carried to alter the source sink load. In all these treatments a great deal of compensatory response was seen. Vegetative development was prolonged by pod removal, which improved various vegetative characters. Secondly vegetative growth was stimulated by production of branches which also acted as sites for compensatory flowers and pod production. The experiment demonstrated the ability of the plant to respond to major pod removal treatments by making morphological responses (branch production), thus the loss of sinks was compensated and hence the yield was improved. Our results are in line with the findings of Gwathmey *et al*. (1992), Molsminkle (1993) and Schulz (1994).

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