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Correlation Study Between Irrigation Frequencies and Brassica Plant Characters

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Abstract: Correlation study between irrigation frequencies and growth yield attributed and yield of brassica species was carried out at Oilseeds Experimental Field of Agriculture Research Institute, Tandojam. Four treatments consisting irrigation frequencies viz. 2, 3, 3, 4, and 5 irrigations and three brassica species i.e Early Raya, Toria Selection and P-269 were studied. The correlation between irrigation frequencies and growth parameters and yield attributes was strong and positive. The regression coefficient indicated that for each increase in irrigation level, the seed yield would increase by 27.78 kg per hectare, but took maximum days to flowering, pod formation, seed formation and delayed maturity.

KeyWords: Brassica, Correlation, Irrigation Frequencies, Growth, Yield

Introduction

In Pakistan the critical shortage of edible oil is increasing rapidly and more than 75% of the total foreign exchange allocated for the import of food items used for purchase of edible oil. Presently domestic production of oilseeds meets only 30% of the country's requirements. Many oilseed crops can be classified as traditional (rapeseed, mustard, groundnut, sesame, linseed and castor). Mustard, rape seed, groundnut, cotton seed, sesame, sunflower and soybean are being used for edible purpose. But there is acute shortage of edible oil in Pakistan, which has started developing since early 70's, though impressive improvement has been made in development of agriculture sector yet chronic shortage in edible oil has persisted, resulting in heavy import to meet the consumption demand, (Chaudhry *et al.*, 1988). In Sindh *Brassica juncea* (Sareinh) and *Brassica compestris* (Toria type) are common under cultivation. The per hectare yield of mustard and Toria in Pakiatan is low than other mustard and Toria growing countries of the world. The yield may be attributed due to number of factors such as varieties, chemical fertilizers, plant protection measures, judicious irrigation and other agronomic factors. Among these, irrigation is the most important which can not be over looked in any case, as it plays an important role in increasing the yield per unit area under cultivations. (Dharampal, 1958) found that irrigation gave a significant increase in yield in case of yellow sarsoon. (Joarder *et al.*, 1975) observed that irrigation increased the number of primary and secondary branches, pods, seeds per plant and yield per hectare by 65 and 59% compared with the rainfed crop. Ray and Tripathi (1985) observed that irrigation at IW:CPE ratio of 0.6 significantly increased the growth traits and seed yield of *Brassica juncea* compared with irrigation at IW:CPE ratio of 0.4 The multiple correlation analysis showed that yield was positively associated with number of branches, siliqua per plant, seeds per siliqua and seed index. (Singh and Srivastava, 1986) reported that in *Brassica juncea* application of one irrigation at flower and two irrigations at the floral bud and the siliqua formation stage produced seed yield of 430 and 610 kg per hectare respectively, compared with 330 kg without irrigation. Balouch (1959) reported that two to four irrigations are required for these crops. The first irrigation is applied after 35 to 40 days of sowing, while the subsequent irrigation are given after every month until the crop start changing its colour as approaching to maturity. Keeping in view the above facts and figures of edible oils in country, the correlation study was undertaken because it gives information about correlation response to directional model for the yield and irrigation levels under the agro-climatic conditions of Tandojam.

Materials and Methods

Present study was carried out at Oilseed Section, Agriculture Research Institute, Tandojam. The seeds of the three brassica species were drilled in rows 60 cm apart in four replication split plot design at the rate of 5 kg per hectare, keeping irrigation frequencies as main plots and brassica species as sub-plots having net plot area of 5x3 meters. The irrigation frequencies were: 2, 3, 4, and 5 irrigations. A standard fertilizer dose of 80 kg N and 124 kg P_2O_5 per hectare was applied in the form of urea and single super phosphate. The full dose of phosphorus with half dose of nitrogen was applied at the time of sowing and remaining nitrogen was applied in two splits at the time of flowering and pod formations. All the cultural operations were carried out uniformly in all the treatments. For recording data normally selected five plants in each treatment were tagged. Crop of each treatment were harvested, bundled, dried, threshed separately and winnowed to record the yield. Collected data were tabulated and analysed for simple correlation and regression following the procedures of (Gomez and Gomez, 1984).

Results and Discussion

The data on correlation between irrigation frequencies and growth, yield attributes and seed yield of brassica as affected by irrigation frequencies are presented in Table-1. The results revealed that the correlation between irrigation levels and days to flowering was strongly positive ($r=0.954^{**}$). The coefficient of determination ($r^2=0.909$) explained that 90.0 percent variation occurred in days to flowering due to the variation in irrigation levels. The regression coefficient ($b=0.425$) depicts that for each increase in irrigation

level, the number of days to bear the flowers would increase by 0.43 days per irrigation. The correlation between irrigation levels and days taken to pod formation was significant and positive ($r=0.916^{**}$). The coefficient of determination ($r^2=0.839$) indicated that 83.9 percent variation in days to pod formation could be accounted due to the variation in irrigation levels. The regression coefficient ($b=0.451$) suggested that for each increase in irrigation level, the days to pod formation would increase by 0.45 days. The correlation between irrigation levels and days to grain formation was strong and positive ($r=0.0899^{**}$). The coefficient of determination ($r^2=0.791$) explained that 79.10 percent variation in number of days to grain formation could be occurred by variation in irrigation levels. The regression coefficient ($b=0.335$) revealed that for each increase in irrigation level, the days to grain formation would increase by 0.34 days. The correlation between irrigation levels and days to maturity of the crop was significant and positive ($r=0.990^{**}$). The coefficient of determination ($r^2=0.980$) explained that 98.00 percent variation in days to maturity had occurred due to the variation in irrigation levels. The regression coefficient ($b=3.826$) revealed that each increase in irrigation level, the days to maturity would increase by 3.83 days.

The correlation between irrigation levels and plant height was significant and positive ($r=0.978^{**}$). The coefficient of determination ($r^2=0.957$) indicated that 95.7 percent variation occurred in plant height due to variation in irrigation that for increase in each irrigation level, the plant height would increase by 10.208 cm per plant. The correlation between irrigation levels and number of branches was positively significant ($r=0.986^{**}$). The coefficient of determination ($r^2=0.972$) indicated that 97.2 percent variation in number of branches per plant occurred due to the variation in irrigation levels. The regression coefficient ($b=0.641$) revealed that each increase in level of irrigation the number of branches would increase by 0.64 per plant.

The inter-relationship between irrigation levels and number of pods per plant was positively significant ($r=0.792^{**}$). The coefficient of determination ($r^2=0.627$) indicated that 62.70 percent variation in number of pods per plant occurred due to the variation in irrigation levels. The regression coefficient ($b=10.393$) depicted that each increase in irrigation levels the number of pods would improve by 10.39 per plant and agreed by the findings of (Joarder *et al.*, 1975). The correlation results fully supported by the findings of (Ray and Tripathi, 1985). The correlation between irrigation levels and varieties was strong and positive ($r=0.689^{**}$). The coefficient of determination ($r^2=0.475$) explained that 47.5 percent variation in number of seeds per pod could be accounted for by the variation in irrigation levels. The regression coefficient ($b=0.916$) suggested that for each increment in irrigation level, the number of seeds would increase by 0.92 per pod. The correlation between irrigation and seed weight per plant was positive ($r=0.652^{**}$). The coefficient of determination ($r^2=0.425$) explained that 42.5 percent variation in seed weight per plant occurred due to the variation in irrigation levels. The regression coefficient ($b=0.317$) depicted that for increase of each irrigation level, the seed weight would increase by 0.32 gm per plant. Ray and Tripathi (1985) supported fully these findings.

The correlation between irrigation levels and seed yield per hectare was significant and positive ($r=0.735^{**}$). The coefficient of determination ($r^2=0.540$) explained that 54.00 percent variation in seed yield per hectare was accounted due to variation in irrigation levels. The regression coefficient ($b=27.78$) proved that increase in irrigation levels, the seed yield would increase by 27.78 kg per hectare. The results are in agreement with the findings of Singh and Yousuf (1958), (Singh and Srivastava (1986) and (Ray and Tripathi (1985).

Table 1: Correlation Between Irrigation Frequencies and Brassica Plant Characters

Parameters	Coefficient of		Regression Coefficient
	Correlation r	Determination r^2	b
Irrigation frequencies and days to flowering.	0.954^{**}	0.909	0.425
Irrigation frequencies and days to pod formation.	0.916^{**}	0.839	0.451
Irrigation frequencies and days to grain formation.	0.889^{**}	0.791	0.335
Irrigation frequencies and days to maturity.	0.990^{**}	0.980	3.826
Irrigation frequencies and plant height.	0.978^{**}	0.957	10.208
Irrigation frequencies and branches per plant.	0.986^{**}	0.972	0.641
Irrigation frequencies and pods per plant.	0.792^{**}	0.627	10.393
Irrigation frequencies and seeds per pod.	0.689^{**}	0.475	0.916
Irrigation frequencies and seed weight per plant.	0.652^{**}	0.425	0.317
Irrigation frequencies and seed yield per hectare.	0.735^{**}	0.540	27.78

** = Significant at P=0.01 percent level of probability.

Conclusion

It is concluded that the association between irrigation frequencies, growth, seed yield components and yield was positive and significant. The regression coefficient suggested that for each increase in irrigation levels, the seed yield would be increased by 27.78 kg per hectare.

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