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Effect of irrigation frequencies on the morphological attributes Wheat crop under Wheat-Chickpea intercropping

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Abstract

The present experiment aimed to observe the Effect of irrigation frequencies on the morphological attributes Wheat crop under Wheat-Chickpea intercropping. The experiment was laid out in randomize complete block design (RCBD) with four treatments and three replications on replications on experimental field at School of Agriculture, Lovely Professional University, Phagwara, Punjab. The treatments were T_0- Control, T_1- RDF+ Recommended number of Irrigation frequencies (W-5, C-2), T_2- RDF+ Less number of Irrigation frequencies (W-4, C-1), T_3- RDF+ High number of Irrigation frequencies (W-6, C- 3). Growth characters were recorded in 45 DAS, 90 DAS, 135 DAS. Result shows that Maximum and the recommended irrigation frequencies increased the plant height, leaf size, spike length, number of tillers, stem girth. Intercropping of these both crop also a showed a significant variations in different irrigation frequencies on the morphological attributes. Intercropping also showed great response in the less moisture condition which can beneficial to the farmers.

Key words: Wheat, Chickpea, Intercropping, Irrigation frequencies,

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Introduction

Wheat is one of the most consumed cereal crop in the world, which is cultivated all over the world. Various kinds of wheat together make up the variety *Triticum,* the most comprehensively advanced wheat (*T. aestivum*). Wheat is commonly known as the "king of cereal" for a significant life span and it is still holding the pride of place even today. Wheat is on the principle food grain eat by people all over the world and is known of 35 percent of the aggregate population depends on wheat, as it contribute more enhancements particularly basic body need like amino acids than some other cereal crop. Intercropping of cereals and legumes is an ignored subject in agricultural science and practice in both conventional and natural cultivating frameworks (Dahlmann, Fragstein, 2006). The reason for intercropping is to create gainful organic associations between the products. Intercropping can expand grain yields and stability, efficiently utilize accessible resources, decrease weed interaction and maintain plant health (Hauggaard-Nielsen *et al.*, 2001). Intercropping is a method of growing of crop which includes developing of two or more crop yield species or varieties the same time in particular line mix on a same field (Katyayan 2005). Increased of the resource utilization for higher productivity with intercropping can be done (Tilman *et al.* 2002). The total population of world is expanding quickly, and in order to have optimum food, one of the most important strategies is to increase the crop yield in per unit area of total available land, which appears decreasing step by step. So, to boost the agricultural land utilize and yield, a definitive objective of farming, specifically yield, intercropping, is a progressed agronomic strategy that enables at least 2 or more crops growing in the same experimented field.

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Better usage of agricultural land, sources and decreased weed establishment in field, limit the risk of food security by improving yield stableness. A few elements can influence intercropping: number of planting, time of sowing, crop maturity, the selection of variety that is compatible with another variety and the locals financial situations. In intercropping, the land equivalent proportion (LER) is utilized to quantify the total production of field. Since wheat is the vital cereal crop in the globe and is most suitable for intercropping, this work is eyes on wheat-based intercropping. Naser, H. M. (1996) described that balancing of proper irrigation level to supply sufficient quantity of water in the crucial flowering period and grain formation stages, yet permitting moderate stress at vegetative and maturity stages produce the ideal yield with greatest water use efficiency. Islam (1997) suggested that plant height improves with the higher number of irrigation which also improves the total growth and development of the plant. Meena et al. (1998) suggested that wheat grain total yield was the best with conventional recommended irrigation level.

Akhtar et al.(2010) stated that best result was given in the in sole chickpea where optimum irrigation was provide then the intercropping of wheat chickpea. It may be due to available more soil moisture for better overall development of individual plant under Irrigation at pre-flowering stage and pod formation stage (IPFP).

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Chaudhary and Dahatonde (2007) number of irrigation additionally effect on plant growth and development. Potential yield is determined during the early stage of differentiation of inflorescence which decides the number of spike lets formed on each spike. **Kong *et al*. (2002)** reported that the lowest hundred grain weight was obtained from control treatment which were comparable with different irrigation treatments. Huang et al.,(2005) and Das et al., in (2011) described that the length of spike increases with the increasing irrigation level and the highest growth and development of wheat chickpea intercropping was in maximum moisture present in the soil.and

Methods and Methodology

A field experiment was conducted on a sandy loam topsoil soil of Lovely Professional University, Jalandhar, Punjab having pH 7.1 during 2017-18. The climate of the area comes under Agro ecological sub region (northern plain, hot sub humid eco-region Punjab). The area comes under the semi arid zone with the annual rainfall of 527.1mm. The experiment was laid out in Randomize Complete Block Design (RCBD) with four treatments and three replications T_0- Control, T_1- RDF+ Recommended number of Irrigation frequencies (W-5, C-2), T_2- RDF+ Less number of Irrigation frequencies (W-4, C-1), T_3- RDF+ High number of Irrigation frequencies (W-6, C- 3). The morphological data was taken in 45 DAS, 90 DAS, 135 DAS.

The present experiment was conducted in land of Wheat Chickpea intercropping. The crop varieties wheat (HD3086), chickpea (PBG-5) were sown in the last week of November. The wheat and chickpea were sown in the field as sole and as well as in intercropping. The size of the field was 650m2 (Net plot size -624m2). The planting distance for wheat was 30 cm in sole crop, for chickpea 30 cm and for intercropping 30

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cm + 25 cm respectively. Irrigations were given accordingly to the treatment and the morphological data was taken in 45DAS, 90DAS, 135DAS.

Table 1. Irrigation frequencies according to the treatments.

First irrigation	30DAS, 08-01-2018 (Wheat + Chickpea)
Second Irrigation	45DAS,23-01-2018 (Wheat)
Third irrigation	75DAS, 22-02-2018 (Wheat)
Fourth irrigation	90DAS,09-03-2018 (Wheat + Chickpea)
Fifth irrigation	110DAS,28-03-2018 (Wheat + Chickpea)
Sixth irrigation	125DAS, 12-04-2018 (Wheat)

Result and Discussion

Sole Wheat-

In sole wheat the highest plant height was recoded in T_3 (38.70cm), T_3 (75.44cm) and T_3 (76.26cm) at 45 DAS, 90 DAS and 135 DAS while minimum plant height was recorded in T2 (31.90cm), T_0 (68.57cm) and T_0 (69.84cm) at 45 DAS, 90 DAS and 135 DAS. It may be because of water stress significantly decreased the plant height by applying less number of irrigation, as the same result was reported by (Gupta et al., 2001). Water stress certainly decreased the height of the plant in sole wheat crop. Plant height improves with the higher number of irrigation (Islam, 1997 and Gupta *et al.*,).

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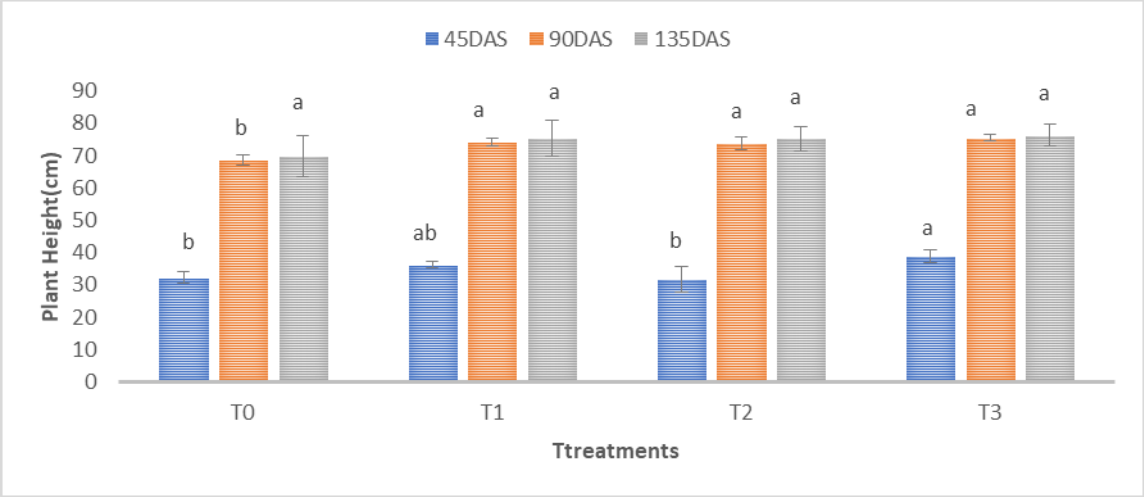

Fig 1: Effect of different irrigation frequencies on plant height of sole Wheat

In sole wheat the highest leaf area was recorded in T_3 (9.22 cm), T_3 (26.62cm) and T_3 (27.48 cm) at 45 DAS, 90 DAS and 135 DAS while minimum leaf area was recorded in T_0 (8.40 cm), T_0 (21.86 cm) and T_0 (24.08 cm) at 45 DAS, 90DAS and 135 DAS. It may be because moisture of soil boosted the plant growth and development, as a result leaf area got increased. The same result also shown that number of irrigation additionally effect on plant growth and development which described in this study is also supported by Naser (1996).

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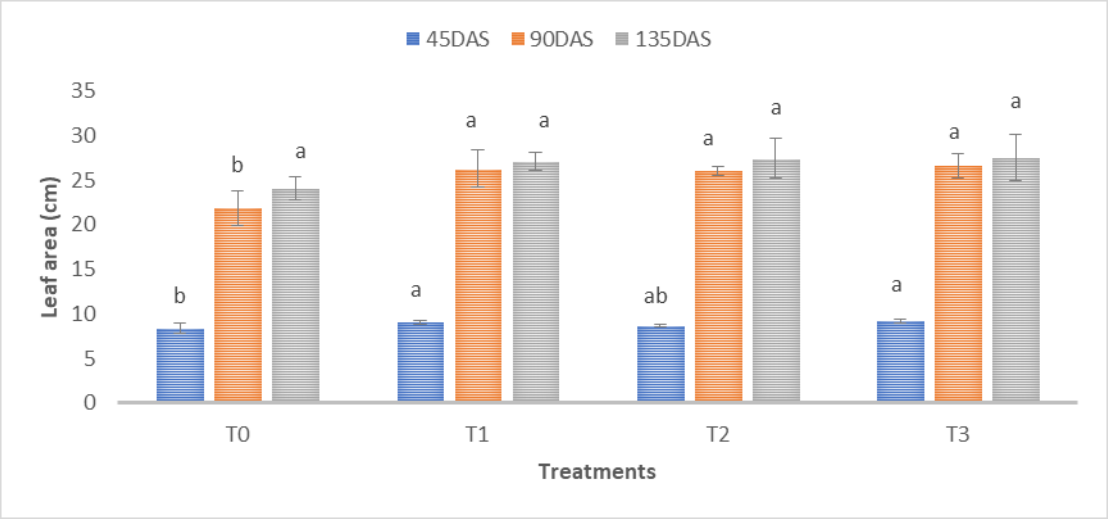

Fig 2: Effect of different irrigation frequencies on Leaf area of sole Wheat

In sole wheat, highest tiller number per meter row T_1 (122.66), T_2 (127.66) and T_3 (124.66) was recorded at 45DAS, 90DAS and 135DAS. While the lowest no. of tillers per meter row T_0 (104.66), T0 (113.66) and T_0 (106.00) was recorded at 45 DAS, 90 DAS and 135 DAS. Water stress was imposed at the booting stage caused a greater reduction in number of tillers (Gupta *et al.*, 2001).

Tiller number

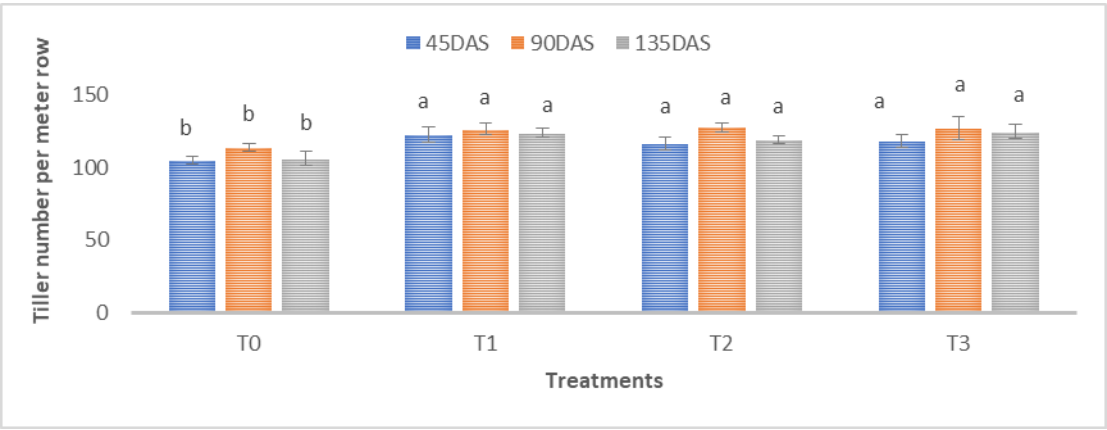

Fig 3: Effect of different irrigation frequencies on Tiller number of sole Wheat

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Intercropped wheat-

In intercropped wheat the highest plant height was recorded in T3 (42.46cm), T1 (91.60cm and T1 (92.56cm) at 45 DAS, 90 DAS and 135 DAS while the minimum plant height was recorded in T0 (38.62cm),T0 (84.36cm) and T2 (87.94cm) at 45 DAS, 90 DAS and 135 DAS. Plant height was significantly influenced by the number of irrigation given to the crop. Similar results have been reported by Rummana *et al.* (2018).

Plant height

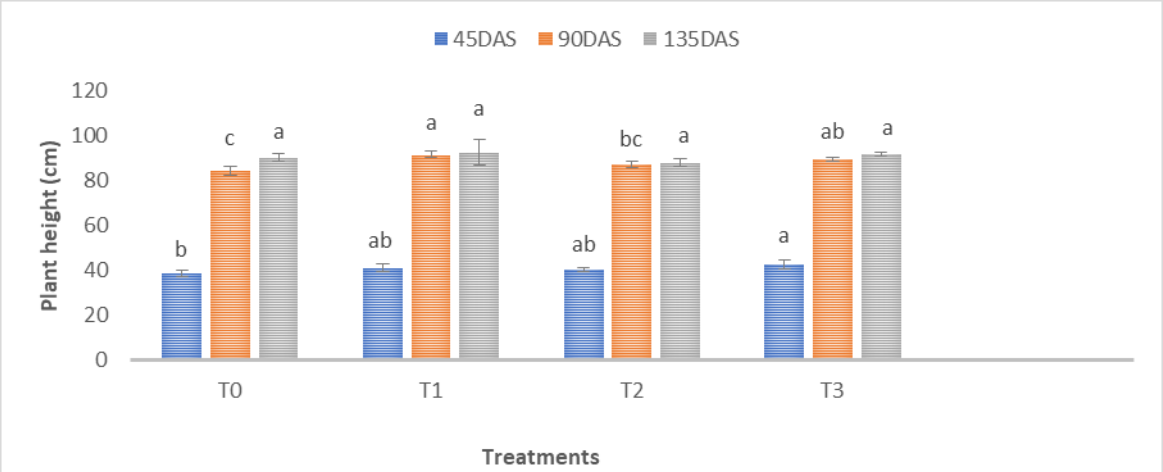

Fig 4: Effect of different irrigation frequencies on Plant height of intercropped wheat

In intercropped wheat the highest leaf area was recorded in T1 and T3 having same value (10.04 cm) at 45 DAS, at 90 DAS and 135 DAS it was recorded in T1 (30.04 cm) and T1 (31.56 cm) while minimum leaf area was recorded in T0 (9.02 cm), T0 (24.60 cm) and T0 (26.20 cm) at 45 DAS, 90DAS and 135 DAS.

It may be because of the higher moisture given to the soil, which increased the total growth and development in which leaf area is an important attribute.

Leaf area

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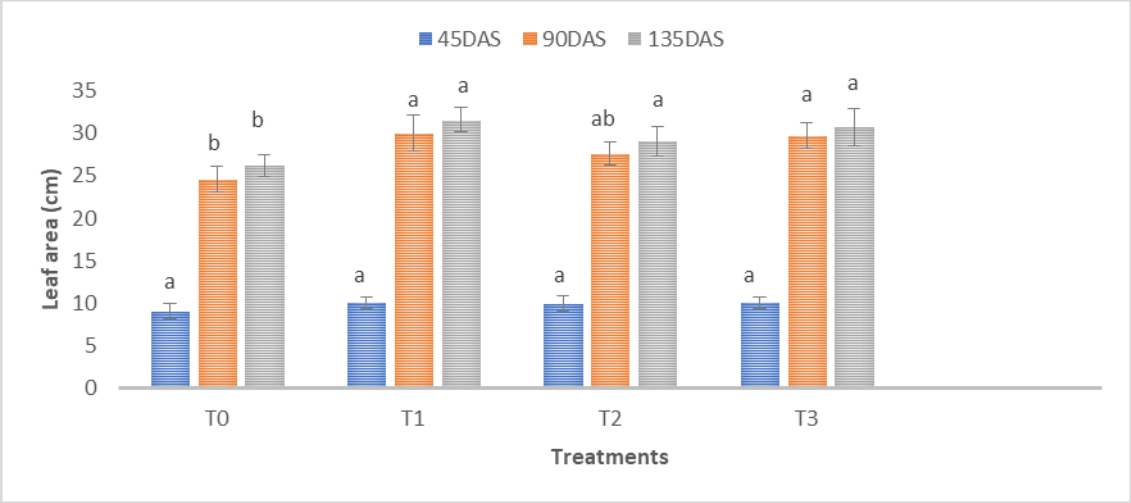

Fig 5: Effect of different irrigation frequencies on Leaf area of intercropped wheat

In intercropped wheat, highest no. of tillers per meter row T_1 (126.66), T1 (136.00) and T_1 (131.33) was recorded at 45DAS, 90DAS and 135 DAS. While the lowest no. of tillers per meter row T_0 (97.66), T3 (117.00) and T_0 (113.00) was recorded at 45DAS, 90DAS and 135 DAS. In all the treatments higher moisture improved the tillers. So it is clear that high moisture can increase the number of tillers in wheat plant. Moisture in proper stages improves the total growth and development in crop.

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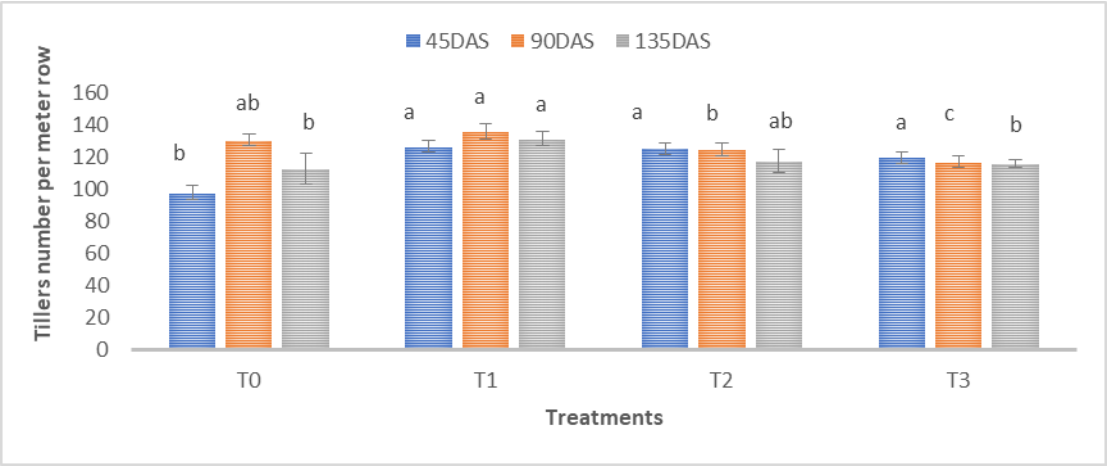

Fig 5: Effect of different irrigation frequencies on Tiller number of intercropped wheat

Conclusion

By doing this experiment in the field conditions we have understood that the different irrigation frequencies have a great influence on the morphological characters of wheat. The plant height, leaf area and the number of tillers has been influenced by irrigation frequencies which is great to find out the best suited irrigation method in the field. By doing this experiment we also got to know that intercropping approach is a best way to minimize the loss during the growth period in field. Such experimentation can create awareness among farmers about better yield in wheat - chickpea intercropping with less irrigation, and future soil health can be managed.

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