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Performance of new wheat genotypes at different dates of sowing under irrigated conditions

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ABSTRACT

Among various production factors for wheat crop, time of sowing and wheat varieties are crucial ones influencing productivity. Onset of various phenophases of wheat crop is greatly related with the prevailing temperature at that time. Any deviation from optimum temperature for onset of phenophase may drastically reduce the crop productivity. Similarly wheat varieties play vital role under different temperature situation. Hence, considering these two aspects an experiment was conducted with objective of Performance of new wheat genotypes at different dates of sowing under irrigated conditions. The treatment comprised of 2 dates of sowing i.e. Timely (5th to 11th Nov.) and Late (3nd to 9th Dec.) and five wheat varieties HI 8498, HI 8737, HD 4728, MPO 1215 and HI 8759. The experiment was laid out in split plot design replicated three times. Results revealed that test weight was significantly affected so sowing of wheat on Timely (5th to 11th Nov.) produced higher Test weight (57.33 gm) compared to Late (3rd to 9th Dec.) sown crop, however in remaining other characters like earhead/m^{-2}, grains per earhead and grain yield (q/ha) found non-significant in different sowing date. Among wheat varieties found significant response for grain yield HI 8737 produced higher grain yield (31.83 q/ha) and remaining all other characters like Grains/earhead, earhead/m^{-2} and test weight found non-significant. thus it can be inferred that for higher productivity and profitability of wheat varieties. The variety HI 8737 performed better compared to HI 8498, HD 4728, MPO 1215 and HI 8759.

Key words: Wheat, genotype, maturity, HI 8498, sowing and soil fertility

Wheat [*Triticum aestivum* (L.) emend. Fiori & Paol.] is the most important staple food crop of the world and emerged as the backbone of India's food security. It is grown all over the world for its wider adaptability and high nutritive value. It is an important winter cereal contributing about 38% of the total food grain production in India. Wheat straw is an important source of fodder for a large animal population in India. In India, wheat is the second most important cereal crop after rice covering an area of 30.79 million hectares. Total annual production of wheat in india is 98.51 million tonnes with the productivity of 3.20 tonnes per hectare during 2017-18 (Anon. 2017-18). India is the second largest wheat producer (approximately 12 per cent world's wheat production) and consumer after China. In Gujarat, wheat is an important *rabi* crop and is grown almost throughout the state with 1.05 million hectares area under cultivation, total production of 3.05 million tonnes and an average yield of 2.89 tonnes per hectare during 2017-18 (Anon. 2017-18).

There are many factors, which are responsible for low average yield of wheat in this tract. Therefore, some efforts have been made to increase the yield by introduction of high yielding varieties, balanced fertilizer application & efficient use of irrigation facilities. But, still there are certain factors on which attention have not

been given to increase the per hectare yield of wheat. One of such environmental factor is date of sowing. This factor affects the yield of wheat crop considerably.

Recently developed new varieties of wheat have potential to replace the old established varieties of the command area. Sowing time significantly influenced the growth, yield attributes, grain and straw yields. There are still many factors, which are responsible for low average yield of wheat in this tract. One of such environmental factors is untimely planting and it affects yield of wheat crop considerably (Saini *et al.* 1988). Another important aspect is lack of improved varieties, which are having short maturity and suitable under late sown condition due to relatively shorter growing period available to crop. Moreover, varieties also vary both in yield and nutrient uptake under late sown condition (Singh *et al.* 1997). Wheat varieties preferably photo and thermo insensitive nature generally suit to a wider range of sowing times in irrigated condition as they could maintain a good level of seed yield even in late sown condition. New varieties of wheat have been developed in the recent pasts which have higher yield potential even under delayed sowing with higher degree of tolerance to high temperature as well as diseases and insect pest resistance to check varieties. Sowing time significantly influences the growth, yield attributes, grain and straw yield.

Keeping in view the aforesaid facts, the present study is being undertaken to evaluate the performance and adaptability of newly developed varieties of wheat to a wider range of sowing dates in irrigated conditions under agro-ecosystem of Northern part of Gujarat.

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MATERIALS AND METHODS

A field experiment was conducted to find out the "Performance of new wheat genotypes at different dates of sowing under irrigated conditions" during *Rabi* season of 2015-16. The experiment consists of ten treatment combinations comprised two dates of sowing (Timely- 5th to 11th Nov. and Late-3nd to 9th Dec.), and Five varieties (HI 8498, HI 8737, HD 4728, MPO 1215 and HI 8759). The experiment was laid out in Split plot Design (SPD) with three replications. The soil of experimental plot was loamy sand in texture. The soil was low in organic carbon (0.37%) available nitrogen (158.86 kg ha^{-1}) and medium in available phosphorous (39.85 kg ha^{-1}) and potash (276.12 kg ha^{-1}). The wheat varieties were sown with seed rate of 100 kg ha^{-1}, with spacing of 20.0 cm in between two rows. The economics was workout on current market price basis. Nitrogen was given as per recommended dose in the form of urea in which half dose of nitrogen applied as basal dose at the time of sowing and other half dose in two equal split. The full dose of phosphorus from SSP and potash from sulphate of potash was given as basal at the time of sowing. The values off "F" was worked out and compared with the values of table F at 5 per cent level of significance. The value of S.Em.±, C.D. and C.V. per cent were also calculated (Cochran and cox, 1967).

RESULTS AND DISCUSSION

Effect of date of sowing

Grain Yield

The date of sowing failed to exert significant influence on yield and allied attributes studied. However, the treatment D_1: (5th to 11th Nov.) recorded numerically higher grain yield (28.71 q/ha) over D_2 sowing.

Ear head/m^2

Date of sowing had non-significant effect on ear

head/m^2 of wheat. However, late sowing (3rd to 9th Dec.) recorded numerically higher ear head/m^2 (303).

Grains/ear head:

The effect of dates of sowing was found non-significant on number of grains/ear head. However, slightly higher (19.18) number of grains were recorded under timely sowing (5th to 11th Nov.)

Test weight (g)

Test weight was significantly affected by different dates of sowing. Result revealed that significantly higher test weight (57.33 g) was recorded under timely sowing (5th to 11th Nov.) which was at par with sowing date (3rd to 9th Dec.).

It might be due to timely sown condition, the temperature and other climatological parameters were favourable for the growth of plants while under late sown condition, delayed emergence of seedlings caused by low temperature at sowing time and early maturity due to high temperature during reproductive phase with lesser time available for the expression of various phenophases particularly the process of grain filling in case of late sown crop (Randhawa *et al.*, 1992).. These results are in conformity to the findings of Dhaka *et al.* (2006) and Singh (2010).

Table 1 Yield and yield parameters of wheat genotypes at different date of sowing under irrigated conditions

Treatments	Grain Yield (q ha^{-1})	Ear head/m^2	Grains/ Ear head	Test weight (g)
Date of sowing				
D_1:Timely (5th to11th Nov.)	28.71	260	19.18	57.33
D_2:Late (3rd to 9th Dec.)	27.50	303	16.97	54.34
SEm+	2.63	7.59	0.97	3.61
LSD (P=0.05)	NS	NS	NS	25.03
CV (%)	36.21	10.44	20.78	10.13
Varieties :				
V_1: HI 8498 (d)	31.24	293	19.66	54.98
V_2: HI 8737 (d)	31.83	284	19.87	57.28
V_3: HD 4728 (dl)	27.85	287	17.13	58.73
V_4: MPO 1215 (d)	19.17	266	14.38	51.47
V_5: HI 8759 (d)	30.45	278	19.34	56.70
SEm+	1.60	11.63	1.36	2.31
LSD (P=0.05)	4.79	NS	NS	NS
CV (%)	13.91	10.12	18.49	10.13
D X V	NS	NS	NS	NS

EFFECT OF VARIETIES

Grain Yield

The result revealed that response of different varieties found significant. The significantly higher grain yield (31.83 q/ha) was recorded by genotype HI 8737 (d), however, it was statistically on par with the genotypes HI 8498 (d) and HI 8759 (d), respectively.

It might be due to variation in yield among varieties might be related to inherent differences and high vigour in growth parameters and yield

attributes led to differences in yield among varieties. These results also colloborate the findings of Singh and Dhaliwal (2000) and Chaudhary and Singh (2007).

Ear heads/m^2

The effect of varieties was found non-significant on ear head/m^2 of wheat. Though, the genotypes HI 8498(d) was registered higher number of ear head/m^2 (293) followed by HD 4728 (d) (287).

Grains/ Ear head

The effect of varieties was found non-significant on number of grains/ear head. Numerically higher number of grains/ear head (19.87) was produced by genotype HI 8737(d) followed by genotype HI 8498(d) (19.66).

Test weight (g)

Test weight was not significantly affected by different genotypes. However numerically higher test weight (58.73 g) was recorded in variety HD 4728 (dl) followed by genotype HI 8737 (dl) (57.28).

CONCLUSION

From the result of experiment it may be concluded that by growing wheat with variety HI 8737 (d) gives higher productivity, yield and profitability as compared to other varieties. However in case of date of sowing result was non-significant so it can be sown at both date (timely and late) there is no effect on yield and growth character.

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Diversification of cropping system as component of small holders farming systems

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ABSTRACT

A field experiment was conducted during 2016-17 at Centre for Research on IFS, SDAU, Sardarkrushinagar, to evaluate the productivity, profitability and improving soil health with eight cropping systems with three replications under randomized block design. Results revealed that cropping system of *kharif* green gram – *rabi* fennel + cauliflower recorded significantly the highest groundnut equivalent yield (72.20 q/ha), highest net realization (₹ 2,64,719/ha), highest benefit cost ratio (2.75), highest system productivity (102.74 kg/day) and system profitability (₹ 1080/day) over rest of cropping systems.

Key words: Groundnut equivalent yield, gross return, net return, system productivity and system profitability

Diversification of cropping system is necessary to get higher yield and returns to maintain the soil health, preserve the environment and meet the daily requirement of human and animals (Samui *et al.*, 2004). Depending on just one crop can have great consequences and leave small-scale farmers open to unnecessary hazards. A slump in the market value for a particular crop could greatly reduce the income of the monoculture producers. Other factors, such as the weather or pests could destroy a large part of the crop, leaving the farmer in ruins. On the other hand, farmers with diversified production can avoid these risks, provide their families with a healthy diet and derive a whole series of other benefits.

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Choice of component crop in the cropping system representing the specific agro-ecological region needs to be suitably maneuvered to harvest the synergism among them toward efficient utilization of resource based and increase overall productivity and profitability. Crop diversification means growing a variety of crops in an area, not just one. Since last decades world is facing bad effect of climate change, in our part also farmers and scientists are facing and observing good and bad effect of climate change. Farmers are seeking alternative crops having higher price and resistance to changing environment. Marginal and small farmers are interested in integrated farming systems having resources conservation and having the efficient utilization of farm wastes and organic manures. Some cropping systems are newly emerging and it is necessary to taste their economical viability and sustainability against present cropping systems therefore present experiment is framed with different diversification cropping systems in such a manner that it can suite in integrated farming system model.