



P-ISSN: 2349-8528
E-ISSN: 2321-4902
IJCS 2019; SP6: 249-251

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(Special Issue -6)
3rd National Conference
On

**PROMOTING & REINVIGORATING AGRI-HORTI,
TECHNOLOGICAL INNOVATIONS
[PRAGATI-2019]
(14-15 December, 2019)**

**Development of crop under diverse environmental
condition and to assess the economics and
acceptability of value based agro advisory to
farmers for crop production**

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Abstract

A field experiments was conducted during *rabi* seasons of 2014-2015 and 2015-2016 at the Agromet. Farm, N.D. University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) with a view to study the Development of crop under diverse environmental condition and to assess the economics and acceptability of value based agro advisory to farmers for crop production. The findings of present investigation indicated that Number of effective tillers (m^{-2}), chlorophyll content (%) and relative water content (%) were significantly influenced due to seed rates at all the stages of wheat. V_3 recorded significantly higher number of effective tillers, chlorophyll content as well as relative water content at all the stages due to more chlorophyll content and tillers. Economic impact assessment of agro-advisory revealed that in late sown wheat crop (05 December) one irrigation at flowering stage alone provided the net benefit of Rs 14350/-, where as, in early sown wheat crop (15 November) it did not make much difference on economics. Risk analysis of fungicide application of five days caused 5 q/ha loss in yield equivalent, to Rs 17350/ha whereas, no adoption of advisory of fungicides application caused he loss of Rs17350/ha.

Keywords: Wheat, environment, crop production, agro advisory, farmer

Introduction

Wheat (*Triticum aestivum* L.) belongs to the poaceae family. It is the single most important cereal crop, that has been considered as integral component of the food security system of several nations. It rank first in the world among the cereals both in respect of acreage 221.76 mha and production 696.64 mt. In India total area under wheat is 29.40 mha with the total production of 93.62 mt and productivity of 2.95 tonnes/ha (Anonymous, 2012-13) [1]. Uttar Pradesh rank first in respect of area and production which is about 9.25 mha with the total production 25.60 mt and productivity of 27.90q ha⁻¹, But the average productivity in our state is comparatively much lower than that of Punjab and Haryana. Although increasing level of production can be achieved by increasing use of fertilizer, but continuous use of chemical fertilizer alone may lead to diminishable yield even with the recommended dose of fertilizer application. Yield potential of crop has reached a plateau as a result of deterioration of soil health in term of depletion of organic matter and nutrients. Besides chemical fertilizer alone may also lead to same detrimental effect on physical and chemical property of the soil and may not be so remunerable unless the fertility of soil is maintained at sustainable level by application of organic manures. Therefore to maintain fertility and productivity of soil at sustainable level for long duration, there is a need to adopt the concept of integrated nutrient

management. Organic manures such as Farm Yard Manure (FYM), and Vermi compost are to be considered and integral component and may help to recover soil health in cropping system as they improve soil fertility and physical properties such as soil, structure, aeration, porosity, infiltration rate, water holding capacity, decrease soil crusting, bulk density, water and wind erosion, organic matter in soil improve physical condition of soil for better performance of micro organism and physical status at soil

Variation in wheat yield from year to year is problem of major importance in agriculture in tropical countries. Although it is generally recognized that annual fluctuation in weather have an important bearing on these variations. A significant yield variation due to weather is observed and the economic implications at farm and state level is seen. An assessment of such variations based on weather factors, could be used to estimate yield prior to final harvest.

Material and Methods

Experimental site

The experiment was conducted at Agromet Research Farm, of Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj) Faizabad (U.P.), during *rabi* season of 2014-2015 and 2015-2016. This farm is located at a distance of 42.0 Km. on Faizabad – Raibareilly road from Faizabad district headquarter.

Topography and climate condition

Geographically the experimental site falls under sub humid, sub-tropical climate of Indo-gangatic alluvial plains having alluvial calcareous soil and is located at 26^o.47' North latitude, 82^o.12' East longitude, at an attitude of 113.0 meter from mean sea level. The weekly mean minimum and maximum temperature during the crop season ranged from 2.9 to 22.0 and 15.2 to 38.5^oC, total rainfall received was 78.2mm during the entire crop season, relative humidity, and sunshine hours were found to vary from 48.0 to 81.5 per cent, and 1.5 to 8.7 hours.

Design and layout

The experiment was conducted with 9 treatment combinations comprised of three varieties in main plot and three seed rates in sub plot was laid out in split plot design with three replications.

Initial plant population

The germinated plants in one meter row length were counted randomly after 15 days of sowing. The average was taken and finally plant population was expressed in per running meter

Plant height (cm)

Five plants were selected randomly in each plot and tagged for measuring height at different intervals. Height was measured at 30, 60, 90 days after sowing and at harvest stage with the help of meter scale from ground surface to the tip of the top most leaf before heading and up to the base of ear head after heading.

Number of shoots m⁻²

The number of shoots were counted per meter row length from three places selected randomly in each plot at 30, 60, 90 days after sowing and at harvested stage.

Chlorophyll content (%)

The total chlorophyll content was estimated following the

method of Arnon (1949) [2] using spectronic 20 spectrometer at 662nm absorbed band and expressed as mg/g fresh weight for each treatment.

Relative water content (%)

Relative water content of the leaf was calculated by using the following formula,

$$RWC (\%) = [(W-DW) / (TW-DW)] \times 100,$$

Where,

W – Sample fresh weight

TW – Sample turgid weight

DW – Sample dry weight

Result and Discussion

Number of effective tillers (m⁻²)

Number of effective tillers m⁻² was significantly influenced due to Varieties at all the stage except 30 DAS. V₃ recorded significantly higher number of effective tillers at all the stages as compared to V₂ and V₁ which did not differed significantly at all the stages due to better translocation of photosynthates from source to sink.

Number of effective tillers m⁻² was significantly influenced due to seed rates at all the stage. Significantly higher number of effective tillers m⁻² were noticed under 100% seed rates (S₂) as compared to S₁ and S₃ at all the stages mainly due to better utilization of available growth resources.

Chlorophyll content (%)

Chlorophyll content (%) was significantly influenced due to Varieties at all the stages. V₃ recorded significantly higher Chlorophyll content (%) at all the stages due to more LAI and no. of tillers as compared to V₂ and V₁ which did not differed significantly at all the stages. Chlorophyll content (%) was significantly influenced due to seed rates at all the stages. Significantly higher Chlorophyll content (%) were noticed under 100% seed rates (S₂) due to more no. of tillers as compared to S₁ and S₃ at all the stages.

Relative water content (%)

RWC was significantly influenced due to Varieties at all the stages. V₃ recorded significantly RWC at all the stages due to more chlorophyll content and tillers which was at par with V₂ and significant over V₃ treatment at all the stages. RWC was significantly influenced due to seed rates at all the stages except 60 DAS and 120 DAS. S₂ recorded significantly RWC at all the stages which was at par with S₃ and significant over S₁ at all the stages

Economic impact assessment of water management operation in Wheat crop

The crops were given three irrigation and economic of study of irrigation scheduling as per advisory were studied to treatment (A₁). But during first week of March one irrigation was recommended due to high prevalence of temperature during last week of February to first week of March i.e. flowering stage.

Economic impact assessment on diseases management operation in wheat crop

Risk of five days in adoption of the advisory only for spraying caused 5q/ha loss in yield equivalent of Rs. 8675/ha, whereas, no adoption of advisory caused the yield loss of 10 q/ha, equivalent to Rs 8675 /ha. Hence, risk of 5

days in adoption of advisory for spraying of fungicides alone will loss of Rs 8675/-

Therefore, advisory is much more important for economic point of view not only to the poor/ medium farmers but, large farmers as well, because large farmers are much more affected economically to the weather hazards as compare to poor/ medium farmers (Olesen 2016) [4]. In Table 1 economic impact and acceptability assessment on disease management operation for farmers is being mentioned.

A. Gross return

Early sown: 69400- 52050 = 17350/-
Net income: 17350- 800 = 16550/-

B. Gross return

Late sown crop: 69400- 60725 = 8675/-
Net income: 8675- 800 = 7875/-

Table 1: Economic impact and acceptability assessment on disease management operation for farmers

Case I (Adoption for irrigation)	Cost (Rs/ha)	Case II (Non-Adoption for irrigation)	Cost (Rs/ha)
Use of fungicides Diethane M-45 @ 1.0 litre/ha (immediately after issue of advisory at 40 DAS)	500/- litre	No spraying	Nil
Labour charges (two labour for one day @ Rs. 150/-day)	Rs.300/-	No spraying	Nil
Yield 40 q/ha	69400/- @ Rs. 1735/- quintal	30 q/ha	52050/- @ Rs. 1735/- quintal
Sprayed five days after issue of advisory (spraying cast, including cast of fungicides)	800/-	--	--
Yield 35 q/ha	60725/- @ Rs. 1735/- quintal		

Economic impact assessment of agro-advisory

In late sown wheat crop (05 December) one irrigation at flowering stage alone provided the net benefit of Rs 14350/-, where as, in early sown wheat crop (15 November) it did not make much difference on economics. Risk analysis of fungicide application of five days caused 5 q/ha loss in yield equivalent, to Rs 17350/ha whereas, no adoption of advisory of fungicides application caused he loss of Rs17350/ha. Dakhore *et al.* in 2008 [5] observed similar results.

Conclusion

Number of effective tillers m⁻² was significantly influenced due to Varieties at all the stage except 30 DAS. V₃ recorded significantly higher number of effective tillers at all the stages as compared to V₂ and V₁ which did not differed significantly. Chlorophyll content (%) was significantly influenced due to Varieties at all the stages. V₃ recorded significantly higher Chlorophyll content (%) at all the stages as compared to V₂ and V₁ which did not differed significantly. The weather during year was very much conducive for powdery mildew and rust diseases in wheat crop, hence, advised for timely spray of Diethane M-45 as remedial measure for both powdery mildew and rust diseases respectively. But, few farmers have taken the risk to spray and avoided to spray as remedy of these diseases and suffered a great loss. Therefore, advisory is much more important for economic point of view not only to the poor/ medium farmers but, large farmers as well, because large farmers are much more affected economically to the weather hazards as compare to poor/ medium farmers.

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