



## Performance of recent wheat (*Triticum aestivum*) varieties to different doses of pusa-hydro-gel

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### Abstract

A field experiment was conducted during Rabi 2019 at Crop Research Center of Chandigarh University, Gharuan (Mohali). Performance of recent wheat (*Triticum aestivum*) varieties to different doses of Pusa-hydrogel. There were total nine treatments comprising of wheat with treatment details were T1: Control, T2: PBW-343 + Pusa-Hydrogel 1.5 kg/ha, T3: PBW-343 + Pusa-Hydrogel 3 kg/ha, T4: PBW-550 + Pusa-Hydrogel 1.5 kg/ha, T5: PBW-550 + Pusa-Hydrogel 3 kg/ha, T6: WH-711 + Pusa-Hydrogel 1.5 kg/ha, T7: WH-711 + Pusa-Hydrogel 3 kg/ha, T8: HD-2967 + Pusa-Hydrogel 1.5 kg/ha, T9: HD-2967 + Pusa-Hydrogel 3 kg/ha. The experiment was laid down in randomized block design with three replications with different varieties and different doses of Pusa-Hydrogel treatments. Growth parameters i.e. plant height (89.3 cm) at harvesting in treatment T3 followed by treatment T2 (86.0 cm), number of effective tillers at harvesting in treatment T3 (256.3) followed by treatment T2 (242), dry matter accumulation at harvesting in treatment T3 (611.5) followed by treatment T2 (593.2), yield attributes, grain yield highest in treatment T3 (48.13 q/ha) followed by treatment T2 (43.77 q/ha) and straw yield recorded highest in treatment T3 (72.23 q/ha) followed by treatment T2 (63.93 q/ha). Which were more in case of treatment of T3: PBW-343+ Pusa-Hydrogel 3 kg/ha. Highest net returns ₹ 54106.67 and net returns per rupee invested of ₹ 2.40 was recorded in treatment T3 followed by treatment T2 in which net returns ₹ 48889.83 and net returns per rupee invested of ₹ 2.38.

**Keywords:** pusa-hydrogel, wheat genotype, growth and yield

### Introduction

Wheat is the leading crop of the temperate climates of the world and a unique world food grain and it's grown on about 200 million ha in a variety of environments, with a yearly production of more than 600 million metric tons (Plaut *et al.*, 2004) [6]. There are abundant managing practices through which water soil relationship can be preserved to make plant withstand water stress condition. Hydrogel is one of the most popular, having also been used to decrease water runoff and increase penetration rates in field agriculture, in addition to increasing water holding capacity for agricultural applications (Sharma, 2004) [7]. The use of hydrogels led to the significant decrease in the number of irrigations, particularly for the soils with large-scale texture (Koupai and Sohrab, 2004) [8]. Reducing transpiration can show a useful role in this respect by preventing the unnecessary loss of water to the air via stomata. The objective of this study was to understand the relationship of hydrogel useful to soil for better yield of wheat.

Wheat (*T. aestivum*) is one of the substantial food crops of the world farming and occupies important position among the cultivated cereals. Farming of wheat has been symbiotic of green revolution that played major role in making the nation a food surplus nation. Wheat is associate of poaceae family with chromosome number 42 and a Self-pollinated crop.

Wheat (*Triticum aestivum* L.) is the most important food crop grown during the rabi season among the cereal crops of the Pakistan and it is ranked on first as compare to the other cereal crops (Lak *et al.*, 2013) and the second most important grain feeding cereal crop in the whole world followed by maize. Generally, crop yield depends on

genetic makeup of seed, soil fertility/soil nutrients, environmental effects and their interactions.

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Keeping in view the importance of potassium, different wheat genotypes were selected to observe the influence of adequate and deficient potassium levels on growth and yields attributes under both conditions.

### Materials and Methods

An experiment entitled "Performance of recent wheat (*Triticum aestivum*) varieties to different doses of Pusa-hydrogel" was conducted during the Rabi season of 2019-20 at university farm of University Institute of Agricultural Sciences, Chandigarh University, Gharuan, Mohali (Punjab). The experiment was laid out in a Randomized Block design with three replications having a plot size of 5m x 2m. Row spacing of 20cm was maintained. Wheat variety PBW-343, PBW-550, WH-711, HD-2967 was sown at the rate 100 kg ha<sup>-1</sup> on 14-12-2019.

During this study T1. Control. T2. PBW 343 + Pusa-Hydrogel 1.5 kg/ha. T3. PBW 343 + Pusa-Hydrogel 3 kg/ha. T4. PBW-550 + Pusa-Hydrogel 1.5 kg/ha. T5. PBW-550 + Pusa-Hydrogel 3 kg/ha. T6. WH-711 + Pusa-Hydrogel 1.5 kg/ha. T7. WH-711 + Pusa-Hydrogel 3 kg/ha. T8. HD-2967 + Pusa-Hydrogel 1.5 kg/ha. T9. HD-2967 + Pusa-Hydrogel 3 kg/ha. Data was analyzed for growth and yield attributing characters like plant height (cm), dry matter accumulation (m<sup>2</sup>), leaf area index, number of effective tillers (m<sup>2</sup>), number of spikelets/spikes, test weight and grain yield were recorded. The data noted on various aspects in the present study was subjected to the statistical analysis using analysis of variance as per technique suggested by Gomez and Gomez (1984).

### Results and Discussion

Effect of irrigation scheduling and organic sources of nutrient on growth parameters (plant height, leaf area index, and dry matter accumulation), yield (grain) and yield attributes (number of effective tillers, test weight, number of spikelets/spike).

#### Plant height (cm)

A close perusal of plant height (cm) of wheat was recorded at 30, 60, 90 DAS and at harvest are presented in table 1. Plant height varied significantly, treatment PBW-343 + Pusa-Hydrogel @3kg/ha (T3) produced significantly taller plants viz. 15cm, 40.3cm, 89cm, and 89.3cm (30, 60, 90 DAS and at harvesting stage) followed by PBW-343 + Pusa-Hydrogel @1.5kg/ha (T2), and lowest plant height was recorded in control (T1). Similar observations were recorded by Singh *et al.* (2015) [2]. This might be due to the effect of higher dose of Pusa-Hydrogel.

**Table 1:** Effect of Pusa-Hydrogel with different treatments on Plant Height (cm), Number of Tillers, Dry Matter Accumulation, Leaf area Index.

Treatments	Plant Height Harvesting	Number of Tiller	Dry Matter Accumulation	Leaf Area Index
		Harvesting	Harvesting	90 DAS
T1	67.7	4.8	554.6	2.5
T2	86.0	6.8	593.2	5.3
T3	89.3	7.4	611.5	6.2
T4	83.0	5.7	566.4	3.2
T5	84.0	6.1	579.4	4.6
T6	80.0	5.8	568.6	3.5
T7	85.3	6.2	574.5	4.6
T8	79.0	5.5	564.7	3.3
T9	83.3	6.4	579.2	4.2
CD (P= 0.05)	1.8	0.4	2.8	0.4

#### Number of tiller

The data pertaining to the number of tillers per plant are presented in table 1. Number of tillers per plant of wheat were recorded at 30, 60, 90 DAS and at harvest number of tillers per plant varied significantly, treatment PBW-343 + Pusa-Hydrogel @3kg/ha (T3) produced significantly higher number of tillers per plant viz. 3.9, 8.2, 7.7, and 7.4 (30, 60, 90 DAS and at harvesting stage) followed by PBW-343 + Pusa-Hydrogel @1.5kg/ha (T2), and lowest number of tillers per plant were recorded in control (T1). Similar observations were recorded by Singh *et al.* (2015) [2]. This might be due to proper compatibility of PBW-343 with higher dose of Pusa-hydrogel.

#### Dry Matter Accumulation

A close perusal of dry matter accumulation of wheat was recorded at 30, 60, 90 DAS and at harvesting stage presented in table 1. Dry matter accumulation varied significantly, treatment PBW-343 + Pusa-Hydrogel @3kg/ha (T3) produced significantly more drymatter viz. 44.6gm, 172.8gm, 329.5gm and 611.5gm (30, 60, 90 DAS and at harvesting stage) followed by PBW-343 + Pusa-Hydrogel @1.5kg/ha (T2), and lowest dry matter was recorded in control (T1). Similar observations were recorded by Ram Pal (2018). This might be due to higher dose of Pusa-Hydrogel.

#### Leaf area index (LAI)

The data pertaining to Leaf Area Index is presented in table 1. A close perusal leaf area index of wheat was recorded at 30, 60, 90 DAS varied significantly, treatment PBW-343 + Pusa-Hydrogel @3kg/ha (T3) produced significantly more leaf area index viz. 4.2, 5.3, and 6.2 (30, 60, 90 DAS) followed by PBW-343 + Pusa-Hydrogel @1.5kg/ha (T2), and lowest was recorded in control (T1). Similar observations were recorded by H. Kaur *et al.* (2014). This might be due to the effect of optimum growing conditions for PBW-343.

#### Number of effective tillers

A close perusal number of effective tillers per meter square presented in table 2. Number of effective tillers per meter square varied significantly, treatment PBW-343 + Pusa-Hydrogel @3kg/ha (T3) produced significantly more effective tillers viz. 256.3 followed by PBW-343 + Pusa-Hydrogel @1.5kg/ha (T2) (242.0), and lowest number of effective tillers was recorded in control (T1) (224.0). Similar observations were recorded by Singh *et al.* (2015) [2].

This might be due to proper compatibility of Pbw-343 with higher dose of Pusa-hydrogel.

#### Number of Spikelets/spikes

A close perusal of fertile spikelet's/ear presented in table 2. Fertile spikelet's/ ear varied more significantly, treatment PBW-343 + Pusa-Hydrogel @3kg/ha (T3) produced significantly more spikelet's (17.0) followed by PBW-343 + Pusa-Hydrogel @1.5kg/ha (T2) (14.0), and lowest fertile spikelet's/ear was recorded in control (T1) (10.0). Similar observations were recorded by Singh *et al.* (2015) [2].

This might be due to the effect of higher dose of Pusa-Hydrogel.

**Table 2:** Effect of Pusa-hydrogel. With different treatments on Number of Effective Tillers, Number of Spikelets/spikes, Test weight, Grain Yield q/ha.

Treatments	Number of effective tillers	Number of Spikelets/spikes	Test Weight	Grain yield q/ha
T1	224.0	10.0	40.7	31.34
T2	242.0	14.0	41.7	43.77
T3	256.3	17.0	44.0	48.13
T4	232.0	12.0	38.7	41.58
T5	235.3	12.7	38.3	41.47
T6	230.3	12.3	42.3	42.57
T7	234.7	12.7	41.0	40.50
T8	231.0	11.3	40.0	41.53
T9	233.3	12.0	40.7	41.30
CD (P=0.05)	2.2	2.3	2.3	1.07

### 1000 grain weight (gm)

A close perusal of 1000 grain weight (gm) presented in table 2. 1000 grain weight (gm) varied significantly, treatment PBW-343 + Pusa-Hydrogel @3kg/ha (T3) produced significantly more weight (44.0) followed by PBW-343 + Pusa-Hydrogel @1.5kg/ha (T2) (41.7), and lowest test weight was recorded in control (T1) (40.4). Similar observations were recorded by Ram Pal (2018). This might be due to proper compatibility of PBW-343 with higher dose of Pusa-hydrogel.

### Grain yield

A close perusal of grain yield presented in table 2. Grain yield varied significantly, treatment PBW-343 + Pusa-Hydrogel @3kg/ha (T3) produced significantly more yield (48.13 q/ha) followed by PBW-343 + Pusa-Hydrogel @1.5kg/ha (T2) (43.77 q/ha), HD-2967 + Pusa-Hydrogel @1.5kg/ha (T6) (42.57 q/ha) and lowest grain yield was recorded in control (T1) (31.34 q/ha). Similar observations were recorded by Kant *et al.* (2011). This might be due to the effect of optimum growing conditions for PBW-343.

### Conclusion

It was concluded that the treatment (T3- PBW-343 + Pusa-Hydrogel @3kg/ha) has given superior results. Followed by Treatment T2- PBW-343 + Pusa-Hydrogel @1.5 kg/ha has given the higher yield and superior results. And also, the net returns and B: C ratio was recorded highest in treatment T3 among all treatments. Grain yield of Treatment T3 was recorded highest among all the treatments.

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