



Response of *Pusa Hydrojel* in Grain Production of Wheat under Moisture Stress Condition of Bundelkhand, Uttar Pradesh

R.K. Singh, V. Joshi, R.C. Mishra, A.K. Gautam and Raj Kumari

K. V.K. Jalaun (U.P.) India

Abstract

The field experiment was laidout during two consecutive years of 2019-20 and 2020-2021 in *rabi* seasons on farmers fields of villages Akori Dubey and Haraka, Jalaun, Bundelkhand of Uttar Pradesh. The experimental soil was *Kawar* (clay loam), having medium fertility status. The two varieties i.e. *WH-147* and *Raj 4120* were sown in the experiment. *Pusa Hydrojel* was applied at the time of field preparation @ 3.75 kg/ha. The wheat variety *WH-147* sown with the application of *Pusa hydrojel* gave highest wheat yield by 50.50 q/ha in comparison to wheat varieties *WH-147* and *Raj 4120*, which were sown by farmers themselves under conventional system. Wheat cv *Raj 4120* gave yield by 43.50 q/ha under conventional system, while *WH-147* produced 39.50 q/ha in conventional system. The highest net return of Rs. 55950/ha and BCR 2.39 were computed under cv. *WH-147* sown with the application of *Pusa Hydrojel*. The yield contributing characters were commensurable to grain yield of wheat.

Keywords: *BCR, Dryland, Moisture stress, Pusa Hydrojel, WH-147.*

Introduction

In the semi-arid unirrigated tracts of India the productivity of wheat is very low. Farmers, however, continue to grow wheat in dryland areas to meet their dietary needs. With the advent of dwarf wheat varieties in 1964-65, considerable progress has been made in yield realization of irrigated wheat the productivity of which at present is ...2.4 t/hq, but the yield of dryland wheat is only about....0.8 t/hq. Wheat is sown in the drylands in the post monsoon period and has to depend on the conserved soil moisture of the monsoon rains. It is sensitive to both photoperiod and temperature. A longer photoperiod than 10 to 12 hour per day coupled with high temperatures during day as well as night during seedling stage cause early differentiation and faster rate of spikelet formation. It leads to reduction in the number of spikelets per panicle. This is main reason for shorter spikes with fewer numbers of grains per panicle in dryland grown wheat (Singh, 1985). In most all dryland areas the crop often suffers from soil moisture stress.

Generally the amount of moisture stored in soil depth of 1 m does not exceed 150 mm in sandy loams. With an average evapo transpiration of 3.00 mm/day during winter, the profile stored moisture can hardly meet the water needs of wheat to complete its maturity (Singh, 1985). The moisture stress becomes severe with the advancement of crop growth. Therefore, dryland wheat farming areas suffer from low and unstable crop production. Being shallow rooted wheat cannot draw water from the lower soil profile and is considered an inefficient crop for dryland (Bains. *et al.*, 1971).

The scientific community have tested many products for increasing the productivity of *rabi* season crops especially wheat grain yield under moisture stress condition. *Jal Sakati* is also one of important moisture saver and it enhanced the wheat productivity under moisture stress condition. Presently *Pusa Hydrojel* also tested on wheat crop under moisture stress condition of Jalaun district on

farmer's fields. Therefore, response of *Pusa Hydrojel* for increasing the wheat production under moisture stress condition is the subject matter of this manuscript.

Materials and Methods

The field experiment was laidout during two consecutive years of 2019-20 and 2020-2021 in *rabi* seasons on farmers' fields of villages Akori Dubey and Haraka, Jalaun, Bundelkhand of Uttar Pradesh. The pilot area was selected under operational area of K.V.K. Jalaun, Banda University of Agriculture and Technology, Banda. The experimental soil was *Kawar* (clay loam), having pH 7.8, organic carbon 0.30%, total nitrogen 0.03%, available phosphorus 15.00 kg/ha and available potash 308 kg/ha, therefore, the nutrients status was medium. The pH was determined by Electrometric glass electrode method (Piper, 1950), while organic carbon was determined by Calorimetric method (Datta, et al., 1962). Total nitrogen was analyzed by Kjeldahl's method as discussed by Piper (1950). The

available phosphorus and potassium were determined by Olsen's method (Olsen. et al., 1954) and Flame photometric method (Singh, 1971), respectively. The cultivars *WH-147* and *Raj 4120* were sown in the experiment and compared with each other under moisture stress condition. *Pusa Hydrojel* was used @ 3.75 kg/ha in cultivation of wheat *H.W.-147*. Variety *Raj 4120* was sown without application of *Pusa Hydrojel*. The *Pusa Hydrojel* was applied at the time of field preparation. The similar conservation agronomical practices were followed in the raising of both cultivars. The protective irrigations were given as and when required. The data on number of irrigation, yield contributing traits and grains yield were recorded and pooled.

Results and Discussion

The pooled data for yield traits, grain yield of wheat and number of irrigations required after use of *Pusa Hydrojel* are summarized in Table -1 and discussed here under appropriate heads.

Table 1: Response of *Pusa Hydrojel* on productivity of wheat

S. No.	Treatments	Irrigation	Grains/panicle	1000-seed weight (g)	Yield (q/ha)	Net profit (Rs./ha)	BCR
1	WH-147+ 3.75 kg/ha <i>Pusa Hydrojel</i>	3	40	38.50	50.50	55950	2.39
2	WH-147 under normal sown condition	4	33	36.00	39.50	35050	1.87
3	Raj 4120 under normal sown condition	4	37	37.25	43.00	44550	2.11

Effect on Yield Traits

Perusals of data make it clear that wheat cultivars *WH-147* sown under use of *Pusa Hydrojel* gave highest grains/panicle by 40.00 closely followed by *Raj 4120* (37 grains/panicle). The cultivar *WH-147* sown under conventional system displayed lowest grains/panicle (33 grains/panicle). Similarly, 1000-grain weight was found highest under wheat *WH-147*, sown under application of *Pusa Hydrojel* by 38.50 g. Cultivar *Raj 4120* registered 37.20 g test weight. Least test weight by 36.00 g was noted under normal sown wheat cv. *WH-147* under conventional system. The application of *Pusa Hydrojel* under moisture stress condition pushed up

the uptake of plant nutrients, supported to highest production of yield traits compared to the normal condition sown wheat *WH-147*. The variation in traits between *WH-147* and *Raj 4120* was due to genetic variability.

Effect on Grains Yield (q/ha)

The wheat cv. *WH-147* grown under the use of *Pusa Hydrojel* @ 3.75 kg/ha gave highest grains yield by 50.50 q/ha, followed by cv. *Raj 4120* grown under normal condition (43.00 q/ha). The cv. *WH-147* grown under conventional system by farmers themselves yielded 39.50q/ha which was lowest. The considerable improvement in yield traits due to application of *Pusa Hydrojel* was responsible for higher yield of wheat. The

lowest improvement in yield traits, supported to the lowest yield of wheat.

Economic Study

The highest net return of Rs. 55950/ha was computed under cv. WH-147 grown under use of *Pusa Hydrojel*, followed by Raj 4120 (Rs. 44550/ha) which was grown without use of *Pusa Hydrojel*. The lowest net return was found under cv. WH-147 grown under normal condition by farmers (Rs. 35050/ha). The grain production of highest and lowest of wheat was responsible for highest and lowest net return. The order of performance of BCR was found wheat cv. WH-147 sown under *Pusa Hydrojel* use (2.39) < wheat cv. Raj 4120 (2.11) < wheat cv. HW-147 (1.87) sown under conventional system.

Requirement of Irrigational Water

Application of *Pusa Hydrojel* restricted and control the evapo-transpiration rate, therefore, water of one irrigation was saved in the field, where it was used in wheat production. The results available in Table -1 display that the wheat cv. WH-147 grown under use of *Pusa Hydrojel* was saved one protective irrigation. The saved of one irrigational water directly influenced to the net income and BCR (Table - 1).

Conclusion and Recommendation

Under moisture stress condition the application of *Pusa Hydrojel* enhanced the productivity of wheat, therefore, farm families residing in moisture deficit area of Bundelkhand may be advocated for used of *Pusa Hydrojel* @ 3.75 kg/ha for wheat production and harvest fruits of newly generated technology.

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