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Effect of natural farming on growth, yield and economics of barley (*Hordeum vulgare* L.)

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Abstract

A field experiment was conducted during rabi season of 2022-2023 at the instructional farm, AKS, University, Sherganj, Satna (M.P.) site is situated at the latitude of 23° 58' N and longitude of 80° 81' East in kymore plateau of M.P. The experiment consisted of 12 treatments in randomized block design with 3 replications viz; T₁ Control, T₂ Jeewamrit, T₃ Panchagavya, T₄ Ghanjeevamrit, T₅ Bija. + Jeewa., T₆ Jeewa. + Pancha, T₇ Pancha. + Ghanjeev, T₈ Bija. + Pancha, T₉ Bija. + Ghanjeev, T₁₀ Jeewa. + Ghanjeev, T₁₁ Bija. + Jeewa. + Pancha. T₁₂ Jeewa. + Pancha. + Ghanjeev. Among the different organic treatments, the combined application of Jeewamrit + Panchagavya + Ghanjeevamrit (T₁₂) resulted in significantly higher plant height as well as number of tillers and leaves per plant over most of the other treatments at every stage of observations. Thus, at 90 days stage, the maximum plant height was 85.16 cm, leaves 7.80/plant and tillers 8.45/plant and At 90 DAS, the maximum tillers were 8.45/plant, 4.85 spikes/plant, 9.86 cm length of spike, 64.32 grains/spike and 43.48 g test weight.

Keywords: Natural farming, nutrients and productivity of barley

Introduction

Barley (*Hordeum vulgare* L) is an important rabi cereal crop in India. It has low cost of production and input requirement, so it is preferred by resource poor farmers in the country. Barley is a nutritious and easily digestible cereal with 8-10% protein, 69.6% carbohydrate, 1.3% fat, 3.9% crude fiber, 1.5% ash, 26 mg calcium, 215 mg phosphorus, 1.2% minerals and 336 calorific values. In India, during 2019-20, Barley occupied nearly 7.72 lakh hectare area producing nearly 17.26 lakh tons grain, with a productivity of 2522 kg/ha Anonymous, (2021) [1].

The crop needs less water and is more tolerant to salinity and alkalinity condition than other winter cereals. The crop possessed very high tolerance to drought and salt. The application of FYM in the soil helps in increasing the fertility of the soils as well as physical condition including water holding capacity (Singh *et al.* 2013) [3]. Plant nutrition plays an important role in growth and productivity of a crop. As barley crop is highly responsive to applied nutrient through various sources, a proper fertility management is an important parameter for optimizing the productivity of this crop.

Materials and Methods

Field studies were conducted during rabi season of 2022-2023 at the instructional farm, AKS, University, Sherganj, Satna (M.P.) site is situated at the latitude of 23° 58' N and longitude of 80° 81' East in kymore plateau of M.P. state of India The soil of the experimental unit was sandy loam in texture, neutral in reaction (7.4) having medium in organic carbon (0.43) and available N (176.60 kg/ ha) and medium in phosphorus (12.50 Kg /ha) whereas it was high in available k (200 Kg/ha). The experimental farm lies in humid subtropical zone with an average rainfall from 1077 mm. The mean temperature ranges from 21 °C to 31 °C during summer and rarely goes below 5 °C in winter due to high atmospheric humidity. The experiment consisted of 12 treatments in randomized block design with 3 replications. Wheat was sown in row 22.5 cm apart, using 100 kg/ha seeds.

Result and Discussion

Growth characters

Among the different organic treatments, the combined application of Jeewamrit + Panchagavya + Ghanjeevamrit (T₁₂) resulted in significantly higher plant height as well as number of tillers and leaves per plant over most of the other treatments at every stage of observations.

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Thus, at 90 days stage, the maximum plant height was 85.16 cm, leaves 7.80/plant and tillers 8.45/plant under T₁₂ treatment. The followed by treatment was T₁₁ (Bijamrit + Jeewamrit + Panchagavya (1000 ml + 500 lit. + 25 lit./ha)] (Bagri *et al.* 2017 and Sunag, 2021) [4, 5].

Yield-attributing

The combined application of Jeewamrit + Panchagavya + Ghanjeevamrit (T₁₂) resulted in significant enhancement in all the yield attributing parameters over all other organic treatments. At 90 DAS, the maximum tillers were 8.45/plant, 4.85 spikes/plant, 9.86 cm length of spike, 64.32 grains/spike and 43.48 g test weight. The second and third best organic

treatments were T₁₁ [(Bijamrit + Jeewamrit + Panchagavya (1000 ml + 500 lit. + 25 lit./ha)] and T₁₀ [Jeewamrit + Ghanjeevamrit (500 lit. + 50 kg/ha)] where triple and double organic formulations were applied, respectively.

Economical

The treatments, T₁₂ having Jeewamrit + Panchagavya + Ghanjeevamrit resulted in maximum net income upto Rs.82770/ha with 3.69 B: C ratio. This was followed by T₁₁ (Rs.76270/ha with 3.48 B: C ratio) and then T₁₀ (Rs.74634/ha with 3.55 B: C ratio) and T₉ (Rs.73322/ha with 3.51 B: C ratio) and T₈ (Rs.69631/ha with 3.38 B: C ratio).

Table 1: Growth parameters and yield-attributes of barley as influenced by natural farming treatments

Tr. No.	Treatments	Plant height (cm)			Number of leaves/plant			Number of tillers/plant		
		30 DAS	60 DAS	90 DAS	30	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
T ₁	Control	23.00	30.90	68.57	1.95	2.87	3.96	1.85	2.84	4.10
T ₂	Jeewamrit	25.85	34.18	72.80	2.60	4.38	5.97	3.27	4.92	6.25
T ₃	Panchagavya	26.10	35.15	72.54	2.65	4.48	5.89	3.41	4.88	6.42
T ₄	Ghanjeevamrit	26.80	36.22	72.92	2.75	4.58	6.05	3.38	4.57	6.50
T ₅	Bija. + Jeewa.	28.15	38.40	73.25	2.95	5.82	6.77	3.83	5.58	7.10
T ₆	Jeewa. + Pancha.	29.36	39.36	73.10	2.68	5.58	6.80	3.72	5.72	7.42
T ₇	Pancha. + Ghanjeev.	28.70	39.72	73.32	2.72	5.62	6.97	3.68	5.86	7.56
T ₈	Bija. + Pancha.	29.65	40.38	74.66	3.10	5.52	6.82	3.65	5.93	7.48
T ₉	Bija. + Ghanjeev.	29.80	40.82	75.11	3.37	5.68	7.10	3.98	6.10	7.60
T ₁₀	Jeewa. + Ghanjeev.	30.12	41.39	78.12	3.59	5.96	6.98	4.00	6.27	8.07
T ₁₁	Bija. + Jeewa. + Pancha.	30.56	42.76	84.20	3.85	6.38	7.42	4.22	6.43	8.32
T ₁₂	Jeewa. + Pancha. + Ghanjeev.	30.76	44.30	85.16	4.19	6.92	7.80	4.48	6.65	8.45
	S.Em ±	0.25	0.42	0.58	0.20	0.27	0.25	0.12	0.15	0.18
	C.D. (P=0.05)	0.72	1.21	1.69	0.58	0.77	0.72	0.34	0.43	0.53

Table 2: Yield-attributes, yield, quality and economics of barley as influenced by natural farming treatments

Tr. No.	Treatments	Spikes per plant	Length of spike (cm)	Grains/spike	Test weight (g)	Grain yield (q/ha)	Straw yield (q/ha)	Harvest index (%)	Grain protein (%)	Net income (Rs./ha)	B: C ratio
T ₁	Control	2.00	5.05	49.92	38.15	23.52	51.37	31.41	9.58	54584	3.08
T ₂	Jeewamrit	3.16	6.96	53.12	39.93	26.76	54.22	33.05	10.94	63374	3.28
T ₃	Panchagavya	3.28	6.58	53.37	39.68	26.93	54.87	32.92	10.37	64014	3.31
T ₄	Ghanjeevamrit	3.12	6.83	53.44	39.74	26.86	55.90	32.46	11.15	64010	3.31
T ₅	Bija. + Jeewa.	3.67	7.68	58.37	41.58	27.68	56.15	33.02	11.53	65020	3.22
T ₆	Jeewa. + Pancha.	3.87	7.88	60.10	41.79	28.53	55.36	34.01	10.97	67412	3.30
T ₇	Pancha. + Ghanjeev.	3.70	7.98	61.68	41.48	28.86	55.72	34.12	11.48	68474	3.34
T ₈	Bija. + Pancha.	3.88	8.19	60.74	41.54	29.15	57.16	33.77	12.10	69631	3.38
T ₉	Bija. + Ghanjeev.	3.35	9.10	61.98	41.85	30.26	58.96	33.92	12.74	73322	3.51
T ₁₀	Jeewa. + Ghanjeev.	4.26	9.24	63.85	41.98	30.65	59.67	33.93	12.86	74634	3.55
T ₁₁	Bija. + Jeewa. + Pancha.	4.60	9.48	64.10	42.83	31.76	58.70	35.11	13.10	76270	3.48
T ₁₂	Jeewa. + Pancha. + Ghanjeev.	4.85	9.86	64.32	43.48	33.72	61.80	35.30	13.19	82770	3.69
	S.Em ±	0.05	0.08	0.52	0.29	0.53	0.62	0.16	0.11	--	--
	C.D. (P=0.05)	0.15	0.24	1.49	0.83	1.52	1.78	0.46	0.33	--	--

Conclusion

Based on one year field experimental data, it is concluded that amongst the applied organic sources of nutrients, Jeewamrit 500 lit./ha + Panchagavya 25 lit./ha 4 times + Ghanjeevamrit 50 kg/ha (T₁₂) proved the best treatment for growing barley var. JB-58 for Kymore plateau (Satna region) of Madhya Pradesh. This treatment having triple organics recorded maximum growth parameters (plant height 85.16 cm, leaves 7.80/plant, tillers 8.45/plant), yield attributes (4.85 spikes/plant, spike length 9.86, grains 4.32/spike and test weight 43.48). Thus, the maximum seed yield was 33.72 q/ha

net income upto Rs.82770/ha with 3.69 B: C ratio as well as seed protein was up to 13.19%.

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