

Effect of jalshakti on growth and yield of finger millet (*Eleusine coracana*) and little millet (*Panicum miliaceum*) at plateau region of Bihar

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ABSTRACT

The field experiment was conducted during the rainy seasons of 1986 and 1987 to study the response of jalshakti on growth and yield of finger millet [*Eleusine coracana* (L.) Gaertn.] and little millet (*Panicum miliaceum* L.) in marginal acidic sandy-loam soils at Ranchi. Jalshakti @ 4 kg/ha through furrow placement gave the maximum grain yield of finger millet. Application of jalshakti @ 8 kg/ha as furrow placement gave maximum grain yield of little millet, closely followed by jalshakti @ 10 g/kg seed as seed treatment + 8 kg/ha as furrow application. The increase in grain yields of finger millet and little millet due to application of jalshakti under different rates and methods were 5.4–26.1 and 7.9–33.6% respectively. Only grain weight/ear or panicle of 2 crops among yield components responded significantly to jalshakti. The highest values were recorded with jalshakti @ 4 kg/ha as furrow placement + @ 20 g/kg seed as seed treatment and @ 8 kg/ha as furrow placement + @ 20 g/kg seed as seed treatment in finger millet and little millet respectively. This parameter finally contributed to increased grain yield of the crops.

To increase and stabilize the crop production under rainfed farming the moisture availability at root zone becomes a need to develop. Jalshakti or Super sorb has water-absorbing capacity and may be used as soil amendment to improve available soil-moisture retention and release capacities, especially in the sandy-loam soil. Bandyopadhyay and Ray (1988) proved that mixing of 0.6–1.0% jalashakti with soil might provide ample moisture to the plant in the tension of 2.0–15.0 bar and keep them alive. Finger millet [*Eleusine coracana* (L.) Gaertn.] and little millet [*Panicum miliaceum* L.], both are important rainfed crops, have their different water requirement

and life-span at marginal shallow lands of top hills of Bihar plateau. The experiment was conducted to find out the response of jalshakti at different doses and methods of application on growth and yield of these crops at marginal sandy-loam soils.

MATERIALS AND METHODS

The field experiment was conducted during the rainy (*kharif*) seasons of 1986 and 1987 at Ranchi, on upland soil (23°17'N, 85°19'E and 625 m above mean sea-level). The soil was latisol, sandy loam (76.6% sand, 10.2% silt and 13.2% clay), low in fertility status (0.0342% total nitrogen, 37 kg/ha available P₂O₅ and 58 kg/ha

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Table 1. Effect of jalshakti on grain yields of finger millet and little millet

Treatment	Grain yield of finger millet (q/ha)			Grain yield of little millet (q/ha)		
	1986	1987	Mean	1986	1987	Mean
T ₁ , seed treatment with jalshakti @ 10 g/kg seed	17.51	20.68	19.09	8.40	8.44	8.42
T ₂ , seed treatment with jalshakti @ 20 g/kg seed	16.48	17.79	17.13	8.78	8.64	8.71
T ₃ , furrow placement of jalshakti @ 4 kg/ha	19.49	21.52	20.50	9.27	9.46	9.37
T ₄ , furrow placement of jalshakti @ 8 kg/ha	18.18	19.55	18.86	9.85	10.90	10.38
T ₅ , T ₁ + T ₃	17.78	19.42	18.60	8.52	8.23	8.38
T ₆ , T ₁ + T ₄	18.55	17.46	18.00	9.70	9.88	9.79
T ₇ , T ₂ + T ₃	19.80	20.17	19.98	9.81	9.46	9.64
T ₈ , T ₂ + T ₄	18.37	18.35	18.36	8.86	9.06	8.96
T ₉ , control (no jalshakti)	15.47	17.06	16.26	7.38	8.15	7.77
CD (P = 0.05)	2.08	2.38	1.78	1.07	1.61	1.46

exchangeable (K₂O) and acidic (pH 5.9) in nature. The experiment was laid out in randomized block design with 3 replications consisting of 9 treatments. 'A 404' and 'V 17' were sown in rows at 22.5 cm apart on 28 June and 5 June respectively in 1986 and 4 July and 30 June respectively in 1987. Finger millet was fertilized with 40 kg N, 25 kg P₂O₅ and 20 kg K₂O/ha and little millet with 40 kg N and 20 kg P₂O₅/ha. Half dose of N, full dose of P₂O₅ to little millet were applied at the time of sowing and remaining half of N was top-dressed to both crops at 21 days after sowing. Finger millet received 82 and 85 cm rain water during 1986 and 1987 and little millet received 81 and 83 cm during 1986 and 1987 respectively.

RESULTS AND DISCUSSION

Growth and yield components of crops

Plant height and tillers/m² of both finger millet and little millet were not affected by the application of jalshakti (Table 1).

Among 3 yield components of finger millet (ears/m², grain weight/ear and 1,000-grain weight), grain weight/ear was significantly improved by the application of jalshakti compared with the control (no jalshakti), except in the plots receiving the jalshakti as seed treatment @ 10 g/kg seed. Maximum grain weight/ear was recorded from the treatment having jalshakti @ 20 g/kg seed as seed treatment + @ 4 kg/ha through furrow placement. This treatment was significantly superior to the others. Significantly higher grain weight/ear was also received from the plots receiving jalshakti as seed treatment @ 20 g/kg seed, furrow application @ 4 or 8 kg/ha alone and the combination of furrow placement and seed treatments, such as 10 g/kg seed + 4 kg/ha, 10 g/kg seed + 8 kg/ha and 20 g/kg seed + 8 kg/ha. These treatments were at par each other.

Of the 3 yield components of little millet, grain weight/panicle was significantly

Table 2. Growth and yield components of fingermillet and little millet as influenced by jalshakti (mean of 2 years)

Treatment	Fingermillet					Little millet				
	Plant height (cm)	Tillers/ m ²	Ears/ m ²	Grain weight/ ear (g)	1,000-grain weight (g)	Plant height (cm)	Tillers/ m ²	Panicles/ m ²	Grain weight (g)/ panicle	1,000-grain weight (g)
T ₁ , seed treatment with jalshakti @ 10 g/kg seed	118.2	110	62	4.796	3.312	103.8	392	376	0.686	2.23
T ₂ , seed treatment with jalshakti @ 20 g/kg seed	114.6	112	60	5.635	3.347	101.1	406	379	0.725	2.14
T ₃ , furrow placement of jalshakti @ 4 kg/ha	115.0	106	62	5.718	3.332	103.7	395	377	0.604	2.18
T ₄ , furrow placement of jalshakti @ 8 kg/ha	116.0	96	65	5.501	3.338	98.9	408	382	0.696	2.13
T ₅ , T ₁ + T ₃	116.0	97	57	5.317	3.342	102.7	401	379	0.795	2.16
T ₆ , T ₁ + T ₄	109.4	104	59	5.174	3.355	107.6	408	383	0.863	2.15
T ₇ , T ₂ + T ₃	112.9	100	60	6.235	3.358	101.5	418	382	0.842	2.18
T ₈ , T ₂ + T ₄	108.2	105	62	5.773	3.331	105.8	405	388	1.006	2.17
T ₉ , control (no jalshakti)	111.9	103	61	4.132	3.314	103.0	408	399	0.599	2.15
CD (P = 0.05)	NS	NS	NS	0.702	NS	NS	NS	NS	0.084	NS

NS, Non-significant

increased by the application of jalshakti with the exception that when it was placed into furrows @ 4 kg/ha. The maximum grain weight/panicle was obtained from the plots receiving the jalshakti @ 20 g/kg seed as seed treatment + 8 kg/ha through furrow placement, followed by the treatments having combined application of the jalshakti through seed treatment and furrow placement as such, 10 g/kg seed + 4 kg/ha, 10 g/kg seed + 8 kg/ha and 20 g/kg seed + 4 kg/ha. The differences in value between 3 treatments were not significant. The grain weight/panicle was also significantly improved in plants grown in the plots receiving jalshakti as seed treatment @ 10 and 20 g/kg seed each and furrow placement @ 8 kg/ha compared with the control (no jalshakti).

This parameter of both the crops was highly responsive to jalshakti and finally contributed to grain yields of the crops.

Grain yield of crops

The grain yield of finger millet was significantly increased under the treatment of jalshakti @ 4 kg/ha through furrow application during both the years and in the mean data (Table 2). Seed treatment of jalshakti @ 10 g/kg seed, furrow placement

@ 8 kg/ha and combinations of seed treatment and furrow placement (10 g/kg seed + 4 kg/ha, 20 g/kg seed + 4 kg/ha and 20 g/kg seed + 8 kg/ha) were significantly superior to the control and the other treatments; but no significant differences in the grain yields among these treatments were noticed from pooled data.

The pooled analysis of grain yield of little millet showed that the application of jalshakti @ 4 and 8 kg/ha separately through furrow placement and some treatments where seed treatment and furrow placement were combined, such as 10 g/kg seed + 8 kg/ha and 20 g/kg seed + 4 kg/ha, significantly increased the grain yield of little millet compared with the control and the other treatments. However, these 2 treatments were at par each other.

It was concluded that grain yields of finger millet and little millet could be increased with the application of jalshakti at least @ 4 kg/ha through furrow placement or with the combination of 10 or 20 g/kg seed as seed treatment at plateau region of Bihar.

REFERENCE

- Bandyopadhyay, S. K. and Ray, S. B. 1988. Changes in some physical properties of sandy loam soil as influenced by Jalshakti. *Indian Journal of Agronomy* 33 (4) : 447-450.