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EFFECT OF DIFFERENT LEVELS OF NUTRIENTS UNDER DRIP FERTIGATION FOR ENHANCING PRODUCTIVITY AND PROFITABILITY IN GOBHI SARSON (*BRASSICA NAPUS*)

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ABSTRACT

An experiment was conducted during *rabi* season of 2018-19 and 2019-20 at Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur Chhattisgarh to study the optimization of nutrient level under drip fertigation for enhancing productivity and profitability in gobhi sarson**.** The experiment was laid out in randomized block design (RBD) with three replications having eight treatments. T_1: Drip fertigation with 75% RDF, T_2: Drip fertigation with 100% RDF, T_3: Drip fertigation with 125 % RDF, T_4: Drip fertigation with 150 % RDF, T_5: Drip fertigation with 175% RDF, T_6: Soil application of 25 % RDF and Drip fertigation with 75% RDF, T_7: Soil application with 100 % RDF and Drip irrigation, and T_8: no fertilizer and surface irrigation. The results of experiments during 2018-19 and 2019-20 revealed that various growth parameters *i.e.* number of primary and secondary branches plant^{-1}, plant height (cm) and dry matter accumulation as influenced significantly due to different levels of nutrients under drip fertigation. The application of T_5: drip fertigation175% RDF produced the highest growth parameters which was comparable to the treatments of drip fertigation with T_2:100 % RDF, T_3:125 % RDF and T_4:150 % RDF during both the years and on mean basis. However, yield and yield attributing characters such as siliqua plant^{-1}, Number of seed siliqua^{-1}, length of siliqua, 1000 seed weight, seed yield, stover yield and harvest index were also recorded the highest under the treatment of T_5: drip fertigation with 175 % RDF which was found at par to the treatments of drip fertigation with T_2:100 % RDF, T_3:125 % RDF and T_4:150 % RDF during both the years and on mean basis.
***Keywords*:** Nutrients, Drip fertigation, productivity, profitability, gobhi sarson

Introduction

Oilseed crops play an important role in agriculture as well as in the economy of the country. Rapeseed and mustard is the third most important edible oilseed crop of the world after soybean (*Glycine max*) and palm oil (*Elaeis guineensis J acq.*). In India, area, production and productivity of Rapeseed-mustard was 6123.93 thousand ha, 9255.66 thousand tonnes and 1511 kg ha^{-1}, respectively (Anonymous, 2018-19). In Chhattisgarh, area and productivity of rapeseed-mustard was 157.67 thousand ha, and 564 kg ha^{-1} (Anonymous, 2019), respectively. Rapeseed and mustard comprise four sub-species namely *Brassica campestris* (var. toria, yellow sarson and brown sarson), *Brassica juncea* L. (Indian mustard), *Brassica napus* L. (*gobhi sarson* and canola) and *Brassica carinata* A. Br. (African sarson) besides *Eruca sativa* (Taramira). Among these crops, canola varieties are internationally accepted for higher yield potential. *Brassica napus* is an amphiploid between *Brassica Campestris* and *Brassica oleracea* and popularly known as *gobhi sarson*. It is a high yielding oilseed crop suitable for high fertile soils under assured irrigation condition. Moreover, it contains higher oil content (41-45 %) of good quality having high percentage of essential fatty acids *i.e.* oleic, linoleic and linolenic acid. Gobhi sarson is a long duration crop and takes 150-170 days for maturity and generally grown as sole crop (Singh *et al.*, 2019). The gobhi sarson is a photo and thermo sensitive crop having wider adaptability. However, it is imperative to assess the performance of gobhi sarson under varied agro climatic especially in areas, where rapseed and mustard is being successfully grown under irrigated ecology. The gobhi sarson has a profuse vegetative growth however mines large amount of nutrients from the soil. Among the nutrients, the role of nitrogen, phosphorus and potash is well established. However, these nutrients need to be optimized to obtain desired growth, yield, nutrient use efficiency and soil health.

Fertigation, a latest technology where in nutrients are applied along with the irrigation water and opens new possibilities for controlling water and nutrient supplies to the crops besides, maintaining the desired concentration and distribution of water and nutrients to the soil (Yosef, 1999). Drip fertigation practice is gaining higher momentum in present day crop production, because water is the vital source for crop production and is the most limiting factor in Indian agricultural scenario. Though India has the largest irrigation network, the irrigation efficiency does not exceed 40 per cent. Due to water scarcity, the available water resources should be very effectively utilized through water saving irrigation technologies. The need of the hour is, therefore, to maximize the production per unit of water and nutrients as well. Therefore, while giving fertigation, it is very important to consider how much fertilizer to be given and when to give the fertigation and also the crop stage to meet its nutrient demand, thereby one can achieve higher water and nutrient efficiency in addition to higher yield and economic returns (Hanumanth *et al.,* 2016) However, drip irrigation and fertigation practices are proven better for efficient nutrient and water management in many commercial crops and also field crops (Shruthi *et al.,* 2018).

Materials and Methods

The field experiment was conducted during rabi season of 2018-19 and 2019-20 at Instructional Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India. Soil of experimental field was *Vertisols*, texturally clay and locally known as "*Kanhar*". At the inception of the experiment, the value of soil chemical properties of 0-15 cm depth like pH (7.2), EC (0.31 dSm^{-1}), Organic carbon (0.61%), Available Nitrogen (241.2 kg ha^{-1}), P_2O_5 (19.8 kg ha^{-1}) and K_2O (441.6 kg ha^{-1}). Agro-climatic condition especially temperature and cool climate play a basic role for growth and development of gobhi sarson. The meteorological data, recorded during 2018-19 and 2019-20 in *rabi* season, crop received the total rainfall of 103.4 mm and 160.8 mm, Maximum temperature of 40.8 °C and 39.0 °C, while minimum temperature was 8.5 °C and 10.8 °C, Relative humidity varied between 18 to 90 % and 24 to 94 %,weekly open pan evaporation ranged between 13.9 to 60.4 mm and 11.9 to 45.3 mm and sunshine hours varied from 1.2 to 9.1 and 2.4 to 9.8 hours day^{-1}, respectively.

The experiment was laid out in randomized block design (RBD) with three replications having eight treatments. The treatments for both the crops were T_1: Drip fertigation with 75% RDF, T_2: Drip fertigation with 100% RDF, T_3: Drip fertigation with 125 % RDF, T_4: Drip fertigation with 150 % RDF, T_5: Drip fertigation with 175% RDF, T_6: Soil application of 25 % RDF and Drip fertigation with 75% RDF, T_7: Soil application with 100 % RDF and Drip irrigation, and T_8: no fertilizer and surface irrigation.

The field was prepared with power tiller to obtain a well pulverized seed bed. The weed and crop residues were removed to get weed and stubble free seed bed. It was leveled with the help of leveler. Drip was laid out in field. The detail of the drip fertigation system used for the experiment are as follows: (a) **Control head:** Pump 5 hp, filter disc filter (b) **Distribution network:** Type of main line- PVC, Size of main line 60 mm, Type of sub main line-PVC, Size of the sub main line- 44 mm, Type of lateral- LDPE, Size of lateral- 16 mm, Type of emitters- Long path in line type, Spacing between emitters- 30 cm, Discharge of emitters-1 LPH and Operating head- 1.0-1.5 kg cm^{-2}.

The gobhi sarson variety RP-09 was grown during *rabi* season in the experiment. It is a high-yielding variety with 4000-4500 siliqua $plant^{-1}$. The plants are 150-200 cm tall. The gobhi sarson was grown on nursery bed and transplanted after 18 days of sowing in main field with a spacing of 90 cm row to row and 60 cm between plants. Gross plot size is 5.4 m x 4.8 m asnd net plot size 2.7 m x 3.0 m. Recommended dose of fertilizer (RDF) was taken as 100:60:40 kg ha^{-1} $N:P_2O_5:K_2O$. Beside drip fertigation, treatment also comprised the combination of 100 % RDF through soil application and drip irrigation (T_7) or 25 % RDF applied as soil application and remaining through drip fertigation (T_6). However, nutrients were applied either as soil application or adopting different fertigation levels as per schedules (Table 1). The soil application of nitrogen, phosphorus and potash in the treatment soil application of 100 % RDF and drip irrigation was given through urea, single super phosphate and muriate of potash. The whole amount of P_2O_5 and K_2O and 50 % N was applied as a basal dressing in both the crops, the remaining amount of nitrogen was applied in two equal splits at 30 and 60 DAT. Similarly, in the treatment soil application of 25 % RDF in both the crop, 25 % RDF was given as basal dressing and remaining nutrient was supplied through drip as per fertigation schedules. For fertigation, urea, phosphoric acid and muriate of potash were used as source. The five plants were selected from each plot for recording growth and yield attributes Plant height (cm), Dry matter accumulation (g plant^{-1}), Dry matter accumulation (g plant^{-1}), Number of siliquae plant^{-1}, Length of siliqua (cm), Number of seeds siliqua^{-1}, 1000-seed weight (g). The harvesting of rows of net plot was done mannualy. The seed, stover and biological yield was measured plot wise and converted in Kg per hectare.

Result and Discussion

Pre-harvest observations

Number of primary branches plant^{-1}

The data pertaining to number of primary branches plant^{-1}was recorded at 30 and 60 DAT as influenced by different levels of nutrients under drip fertigation are presented in Table 2.The findings indicated that the different levels of nutrients under drip fertigation at 30 DAT did not show any significant difference with respect to number of primary branches plant^{-1}of gobhi sarson during both the years. Further advancement of crop age upto 60 DAT, drip fertigation with T_5:175% RDF produced significantly higher number of primary branches plant^{-1}over other drip fertigation levels except drip fertigation levels of T_1:75 % RDF and T_7: soil application of 100 %RDF and T_8: no fertilizer and surface irrigation during both the years. On other hand, the lowest number of primary branches plant^{-1} was observed under the treatment of T_8: no fertilizer and surface irrigation in all growth stages of crop during both the years and on mean basis.

Number of secondary branches plant^{-1}

The data presented in Table 2. Reveals the periodic changes in number of secondary branches plant^{-1} due to different levels of nutrients under drip fertigation in gobhi sarson. The number of secondary branches plant^{-1}was significantly influenced at 60 and 90 DAT and at harvest due to different levels of nutrients under drip fertigation.

Among different fertigation levels, drip fertigation with T_5:175% RDF produced the highest number of secondary branches plant^{-1} at 60 and 90 DAT (*viz.* 22.99 and 37.04 respectively). This treatment found to be significantly superior to other treatments, but it was at par to drip fertigation with T_3: 125 % RDF and 150 % RDF during both the years and on mean basis during growth stages. Moreover, in addition to these treatments, the drip fertigation level of T_6: soil application of 25 % RDF and drip fertigation with 75 % RDF at 60 DAT and T_2: 100 % RDF through fertigation at 60 and 90 DAT gave the comparable number of secondary branches plant^{-1} to that of T_5: 175 % RDF through drip fertigation. The lowest number of secondary branches plant^{-1} was observed under the treatment of T_8: no fertilizer and surface irrigation in all growth stages of crop during both the years and on mean basis.

Plant height (cm)

Among different fertigation levels, drip fertigation with T_5:175% RDF produced significantly taller plants at all the growth stages, (99.5, 181.7 and 204.0 cm, respectively) as compared to other fertigation levels during both the years and on mean basis. However, it was statistically at par to all other treatment except T_1: drip fertigation with 75 % RDF and T_8: no fertilizer and surface irrigation at 60 DAT during both the years and on mean basis. Further, at 90 and 120 DAT it was statistically at par to drip fertigation with T_2:100% RDF, T_3:125% RDF, T_4:150% and T_6: soil application of 25 % RDF combined with drip fertigation with 75 % RDF during both the years and on mean basis. The shortest plant was recorded in treatment of T_8: no fertilizer and surface irrigation in all growth stages of crop during both the years and on mean basis Table 3.

Dry matter accumulation (g plant^{-1})

As regards to the dry matter accumulation, drip fertigation with T_5:175 % RDF produced the highest dry matter accumulation (*viz*, 365.07 and 687.99 g plant^{-1}, respectively) at 90 and 120 DAT, which was comparable to the treatments of T_2: 100 % RDF, T_3: 125 % RDF, T_4: 150 % RDF through fertigation. The lowest dry matter accumulation was noticed under the treatment of T_8: no fertilizer and surface irrigation at all the observations stages during both the years and on mean basis Table 3.

Post-harvest observations

Number of siliqua plant^{-1}, Number of seeds siliqua^{-1} and Length of siliqua (cm)

The number of siliqua plant^{-1} and number of seeds siliqua^{-1} were significantly influenced by different levels of nutrients under drip fertigation practices (Table 4). The length of siliqua was not influenced significantly due to different levels of nutrients under drip fertigation. The significantly higher number of siliqua plant^{-1} was obtained under drip fertigation with T_5: 175 % RDF (3441) as compared to others treatments i.e. T_1 drip fertigation with 75 % RDF, T_7: soil application of 100% RDF and drip irrigation and T_8: no fertilizer and surface irrigation during both the years. The remaining treatments were found at par to T_5: 175 % RDF through drip fertigation both the years and on mean basis.

Significantly highest number of seeds siliqua^{-1} was also obtained under T_5: 175 % RDF (14.73) through drip fertigation which was at par to drip fertigation in T_2:100% RDF, T_3:125% RDF, T_5:150% RDF and T_6: soil application of 25 % RDF combined with drip fertigation with 75 % RDF during both the years and on mean basis. Although, the length of siliqua did not vary significantly but highest length of siliqua (4.83 cm) was observed under the treatment of drip fertigation with 175 % RDF. The least number of siliqua plant^{-1}, seeds siliqua^{-1} and length of siliqua was observed under treatment of T_8: no fertilizer and surface irrigation during both the year and on mean basis.

1000-seed weight (g)

The data on 1000-seed weight of gobhi sarson as influenced by different levels of nutrients under drip fertigation are presented in Table 5. The findings revealed that significantly highest 1000 grain weight (4.64 g) was obtained, when crop was applied with drip fertigation level of T_5: 175 % RDF, which was statistically similar to the treatments of T_2: 100 % RDF, T_3: 125 % RDF and T_4: 150 % RDF through drip fertigation. The lowest 1000 grain weight (4.05 g) was recorded under the treatment of T_5: no fertilizer and surface irrigation during both the years and on mean basis.

Seed yield (q ha^{-1}), Stover yield in (q ha^{-1}) and Harvest index (%)

Data related to seed and stover yields and harvest index of gobhi sarson are presented in Table 5.

The seed and stover yield of gobhi sarson was significantly influenced by different levels of nutrients under drip fertigation. The drip fertigation level of T_5: 175 %RDF produced the highest seed yield (37.97, 35.53 and 36.75 q ha^{-1}) and stover yield (124.37, 112.10 and 118.24 q ha^{-1}), during 2018-19, 2019-20 and on mean basis, respectively. This treatment gave the comparable seed and stover yields to that of drip fertigation level of T_2: 100% RDF, T_3: 125 % RDF, T_4: 150% RDF during both the year and on mean basis. Moreover, the treatment of T_6: soil application of 25 % RDF combined with 75 % RDF through drip fertigation also produced comparable seed yield to that of 175 % RDF through fertigation. On other hand, significantly lower seed yield was recorded under the treatment of T_8: no fertilizer and surface irrigation treatment during both the year and on mean basis. The data of harvest index varied between 18.31 to 23.73 % and was found to be non significant.

Table 1: Fertigation schedule in gobhi sarson

Treatment	N (g/plot) at different intervals						P_2O_5 (g/plot) at different intervals					K_2O (g/plot) at different intervals				
	10%	15%	30%	30%	15%	Total	20%	30%	30%	20%	Total	25%	25%	25%	25%	Total
	10-20 DAS	21-40 DAS	41-65 DAS	66-90 DAS	91-110 DAS	10-110 DAS	10-20 DAS	21-40 DAS	41-65 DAS	66-90 DAS	10-90 DAS	21-40 DAS	41-65 DAS	66-90 DAS	91-110 DAS	21-110 DAS
T_1- 75 % RDF	43	63	127	127	63	423	43	65	65	43	216	32	32	32	32	128
T_2-100 % RDF	57	84	169	169	84	563	58	86	86	58	288	43	43	43	43	172
T_3-125 % RDF	70	106	211	211	106	703	72	108	108	72	360	54	54	54	54	216
T_4-150 % RDF	85	127	253	253	127	845	86	130	130	86	432	65	65	65	65	260
T_5-175 % RDF	99	148	295	295	148	985	101	151	151	101	504	75	75	75	75	300
T_6-25 % SA +75 RDF	-	85* (20%)	127* (30%)	127* (30%)	84* (20%)	423* (100%)	-	76* (35%)	76* (35%)	64* (30%)	216* (100%)	-	45* (35%)	45* (35%)	39* (30%)	129* (100%)
T_7-100 % SA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T_8- No fertilizer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

RDF- Recommended dose of fertilizer, SA – Soil application

Table 2 : Number of primary and secondary branches plant^{-} of gobhi sarson as influenced by different levels of nutrients under drip fertigation

Treatment	Number of primary branches plant^{-1}						Number of secondary branches plant^{-1}					
	30 DAT			60 DAT			60 DAT			90 DAT		
	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean
T_1 Drip fertigation with 75% RDF	2.60	2.37	2.48	7.23	5.33	6.28	29.26	26.36	27.81	46.17	37.77	41.97
T_2 Drip fertigation with 100% RDF	2.93	2.60	2.77	7.75	5.67	6.71	34.28	30.54	32.41	48.07	41.06	44.56
T_3 Drip fertigation with 125% RDF	3.20	2.88	3.04	8.03	5.81	6.92	35.51	31.93	33.72	50.06	43.10	46.58
T_4 Drip fertigation with 150 % RDF	3.47	3.17	3.32	8.44	6.05	7.24	36.84	32.52	34.68	51.98	43.76	47.87
T_5 Drip fertigation with 175 % RDF	3.67	3.27	3.47	8.62	6.27	7.45	39.27	34.81	37.04	53.36	45.47	49.41

T_6 Soil application of 25 % RDF and drip fertigation with 75 % RDF	3.10	2.66	2.88	7.65	5.44	6.54	31.59	28.50	30.05	46.78	39.47	43.13
T_7 Soil application of 100 % RDF and drip irrigation	2.73	2.67	2.83	7.38	5.36	6.37	27.57	24.55	26.06	44.80	36.47	40.63
T_8 No fertilizer and surface irrigation	2.20	2.07	2.13	5.26	4.20	4.73	20.67	16.67	18.67	30.37	27.77	29.07
SEm±	0.28	0.24	0.26	0.26	0.28	0.27	1.68	1.46	1.63	1.76	1.68	1.53
CD (P=0.05)	NS	NS	NS	NS	0.86	0.82	5.11	4.42	4.95	5.33	5.11	4.62

Table 3: Plant height and Dry matter accumulation (g plant^{-1}) of gobhi sarson as influenced by different levels of nutrients under drip fertigation

Treatment	Plant height (cm)									Dry matter accumulation (g plant^{-1})					
	60 DAT			90 DAT			120 DAT			90 DAT			120 DAT		
	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean
T_1 Drip fertigation with 75% RDF	81.5	76.5	79.0	166.7	159.1	162.9	183.5	177.7	180.6	309.72	293.74	301.73	618.03	576.45	597.24
T_2 Drip fertigation with 100% RDF	91.8	86.6	89.2	174.6	165.9	170.3	198.0	187.3	192.7	358.10	342.12	350.11	665.37	650.09	657.73
T_3 Drip fertigation with 125% RDF	94.5	90.7	92.6	178.4	168.9	173.6	202.3	190.1	196.2	362.57	346.59	354.58	676.80	661.98	669.39
T_4 Drip fertigation with 150 % RDF	97.6	93.0	95.3	182.4	173.2	177.8	206.4	194.5	200.5	367.38	351.40	359.39	683.20	674.89	679.05
T_5 Drip fertigation with 175 % RDF	103.4	95.5	99.5	185.8	177.5	181.7	210.0	198.1	204.0	373.06	357.08	365.07	696.91	679.07	687.99
T_6 Soil application of 25 % RDF and drip fertigation with 75 % RDF	88.4	82.8	85.6	170.1	163.1	166.6	192.9	183.1	188.0	347.17	331.19	339.18	651.94	621.67	636.81
T_7 Soil application of 100 % RDF and drip irrigation	85.2	78.4	81.8	163.7	153.4	158.6	176.6	173.8	175.2	297.04	281.06	289.05	602.83	562.00	582.42
T_8 No fertilizer and surface irrigation	56.0	54.3	55.2	97.0	98.0	97.5	116.0	112.6	114.3	216.70	199.01	207.85	446.83	403.41	425.12
SEm±	6.0	5.8	6.3	5.6	5.0	5.0	6.0	5.0	5.5	6.60	5.21	5.52	13.89	6.73	10.18
CD (P=0.05)	18.3	17.6	19.2	16.9	15.2	15.2	18.3	15.3	16.6	20.00	15.80	16.75	42.14	20.41	30.89

Table 4 : Yield attributing characters of gobhi sarson as influenced by different levels of nutrients under drip fertigation

Treatment	Number of siliqua plant^{-1}			Length of siliqua (cm)			Number of seeds siliqua^{-1}		
	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean
T_1 Drip fertigation with 75% RDF	2980.00	2214.33	2597.17	4.49	3.85	4.17	12.87	12.87	12.87
T_2 Drip fertigation with 100% RDF	3220.00	2913.67	3066.83	4.68	4.44	4.56	13.41	13.35	13.38
T_3 Drip fertigation with 125% RDF	3423.33	2992.30	3207.82	4.73	4.58	4.66	14.33	14.10	14.22
T_4 Drip fertigation with 150 % RDF	3490.90	3108.67	3299.78	4.77	4.60	4.69	14.89	14.25	14.57
T_5 Drip fertigation with 175 % RDF	3626.00	3256.67	3441.33	4.84	4.82	4.83	15.11	14.35	14.73
T_6 Soil application of 25 % RDF and drip fertigation with 75 % RDF	3148.77	2832.40	2990.58	4.59	4.03	4.31	13.30	13.85	13.58
T_7 Soil application of 100 % RDF and drip irrigation	2638.67	2287.00	2462.83	4.39	3.97	4.18	12.27	13.17	12.72
T_8 No fertilizer and surface irrigation	1509.33	1490.83	1500.08	3.73	3.67	3.70	11.67	11.67	11.67
SEm±	157.82	141.35	139.3	0.23	0.29	0.24	0.63	0.38	0.45
CD (P=0.05)	478.68	428.73	421.6	NS	NS	NS	1.91	1.15	1.37

Table 5: 1000-seed weight (g), seed yield (q ha^{-1}), Stover yield (q ha^{-1}) and harvest index (%) of gobhi sarson as influenced by different levels of nutrients under drip fertigtion

Treatment		1000 seed weight (g)			Seed yield (q ha^{-1})			Stover yield in (q ha^{-1})			Harvest index (%)		
		2018	2019	Mean	2018	2019	Mean	2018	2019	Mean	2018	2019	Mean
T_1	Drip fertigation with 75% RDF	4.21	4.11	4.16	32.63	27.53	30.08	109.48	91.45	100.47	23.14	22.95	23.04
T_2	Drip fertigation with 100% RDF	4.43	4.41	4.42	34.89	31.87	33.38	114.30	102.47	108.38	23.77	23.39	23.58
T_3	Drip fertigation with 125% RDF	4.52	4.50	4.51	35.19	32.67	33.93	116.28	103.20	109.74	23.96	23.24	23.60
T_4	Drip fertigation with 150 % RDF	4.61	4.53	4.57	36.89	34.87	35.88	121.05	109.07	115.06	24.21	23.35	23.78
T_5	Drip fertigation with 175 % RDF	4.66	4.62	4.64	37.97	35.53	36.75	124.37	112.10	118.24	24.10	23.36	23.73

T_6	Soil application of 25 % RDF and drip fertigation with 75 % RDF	4.28	4.23	4.25	34.22	31.75	32.99	112.73	100.20	106.47	24.02	23.27	23.64
T_7	Soil application of 100 % RDF and drip irrigation	4.12	4.17	4.14	31.87	29.27	30.57	107.33	96.25	101.79	23.28	22.91	23.09
T_8	No fertilizer and surface irrigation	4.07	4.03	4.05	15.31	13.07	14.19	69.60	58.10	63.76	18.82	17.80	18.31
SEm±		0.12	0.09	0.10	1.6	1.4	1.4	3.3	3.3	3.3	1.2	1.2	1.0
CD (P=0.05)		0.37	0.26	0.30	4.9	4.2	4.5	10.1	9.9	9.9	NS	NS	NS

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