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Growth, Yield and Protein content in wheat (Triticum aestivum L) influenced by methods of sowing and Chemical methods of weed control

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ABSTRACT
A field experiment was carried out during the Rabi season of 2018-19 and 2019-20 at S.D.J.P.G. College Chandeshwar Azamgarh U.P. with a view to study the "Growth, yield and protein content in wheat (Triticum aestivum L) influence by methods of sowing and weed control" to find out the best seeding methods and weed management practices in wheat crop. The wheat variety PBW 343 was used for the research and the treatment replicated 4 times in completely randomized block design. The treatment was made of four methods of sowing i.e. broadcasting(m1) line sowing(m2) criss-cross sowing(m3) and furrow raised irrigated bed system(m4) with four method of weed control viz. unweeded(w1) weed three manually(w2) clodinafop(60g/ha)(w3) and sufo-suforon(25g/ha)(w4) wheat was sown recommended method of sowing and making distance row to row and plant to plant. The outcome of the research revealed that among different methods of sowing(m3) (criss-cross) produced significantly highest grain yield(42.72 and 41.30 q/ha) respective year. The weed control method(w2) (weed free manually produced(42.46,41.07 q/ha) followed by(w3)(41.28, 40.61q/ha and significantly higher than other methods of weed control. The quality of wheat protein % was significantly higher in(11.93,12.02) criss-cross sowing and followed by broadcasting.

Key words: Criss-cross sowing, Broadcasting, nutrients up-take, line sowing.

I. INTRODUCTION

Wheat(Triticum aestivum L) is one of the most three cereals cultivated world wide. In India it is the second most cultivated stapled food crop after rice and grown on all over India in rice-wheat cropping sequence. Rising the demographic pressure has made it nessesary to argument the productivity of cereals food crops including wheat on continues basic to ensure food security(Swaminathan and Bhawani, 2013). This can be achieved by efficient use of resources with improved practices and techonologies with minimum possible environmental damage. Cultural and chemical weed control method are espacilly important for organic food production system where the application of herbicide is absent (Eyre et_al 2011). Weeds cause an enormously damage to wheat crop the magnitude of loss varying with the nature and persistence of weeds population. As the high requirement of fertilizers and irrigation of wheat favours highly infestation to various types of weed species. Although many herbicides have been developed for controlling the all types of weeds. Use the chemical for weed control in India has severallimitation. Such as very costly, being imported and their availability in time is seldom ensured and the type and moisture status of soil, temperature and time of application, desired results from their application may not achieved. Consequently, effective methods of controlling of weeds either by cultural practices or by combination of cultural and chemical means hold great promise. The present experiment was, therefore undertaken on the control of various grass and non grass weeds in wheat through cultural and chemical methods

II. MATERIALS AND METHODS

A field experiment wad conducted at Agronomy Research farm of Shri Durga Ji Post Graduate College Chandeshwar Azamgarh U.P. during Rabi season of 2018-19 and 2019-20. Soil

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of the experimental was sandy loam in texture slightly alkaline in reaction, lo organic carbon(0.33%) and available nitrogen(165.4kg/ha), medium available phosphorus (15.33 kg/ha) and medium available of potassium(238.0 kg/ha).Soil texture was determined Glass electrode pH meter(Jackson 1973) and other methods are employed for chemical evaluation of soil(Table-1). The experiment was laid out in a completely randomized block design(CRBD) with four methods of sowing such as broadcasting(m1) line sowing(m2) criss-cross sowing(m3) and forrow erigated raised bed system(m4) and four methods of weed control methods such as unweeded(w1), weed three manually(w2), clodinofop(w3) and sulfo-sulfuron(w4). With four replication. In crop planting field was prepared as per conventional method. Wheat cv. PBW 343 was seeded on 20 and 25 November 2018 and 2019 respectively. Seeding use 125 kg seed ha^{-1}. Recommended dose of Nitrogen(N) Phosphorus(P) and potassium(K) were applied through Urea, Diammonium phosphate and potassium chloride respectively full dose of P,K and half dose of N were applied at sowing time and half dose of N was in two split half is first irrigation and remaining half was heading stage of crop. Herbicide were applied at 35 days after sowing with the help of Knapsack sprayer fitted with flat pan nozzle using 500 litre of water/ha. The experimental data was statistically analyzed by doing analysis of varience(ANOVA) imploying Fisher's analysis of varience technique and means were caculated.

III. RESULTS AND DISCUSSION

Growth parameters, yield parameters, yield and protein.Data pertaining to growth parameters such as shoot density/m2, plant height cm at heading stage, fresh and dry shoot weight(g) at heading stage, ear density/m2, leaf area index and crop growth rate was recorded given in table 2. And length of spike, number of grains ear^{-1}, grain and straw yield qha^{-1}/harvest index and protein content in Table-3.

Effect of methods of sowing -

Various methods of sowing(broadcasting), line sowing, criss-cross and FRIBS. Significantly influence the shoot density/m2. Criss-cross(1044.34,992.43) method of sowing significantly superior than broadcasting, line sowing and FRIBS. Plant height at heading stage was not affected significantly but FRIBS(50.33,49.47 cm) significantly higher than criss-cross and broadcasting methods of sowing and statistically at par 2 line sowing(49.58,49.09) in experimental year. Fresh shoot weight and dry matter accumulation was higher in m2(line sowing) and other method of sowing were similar to each other. This indicate that higher plant population could not express their potentiality Mali and Chaudhari(2013). For all methods of sowing, ear density /m2 , leaf area index and crop growth rate significantly higher in criss-cross sowing(m3) and FRIBS. Respectivly in experimental year. The significant response was chronicled in the desending order for method of sowing as m3> m1>m2>m4 in experimental year. For all the methods of sowing leaf area index(LAI) and crop growth rate(CGR) increased progressively upto heading stage and then begin to declined significantly lower LAI and CGR recorded under criss-cross sowing Table-2. The efficient use of available resources resulted in higher LAI and CGR in FIRBS. In contrary to our results, Idnani and Kumar(2012) reported higher plant height and higher value of LAI and CGR under FIRBS. The substantial increase in yield related parameters like length of ear, number of grains per year may be attributed to the adequate utilization of resources light, irrigation, nutrient management and cultural operation etc Mali and Chaudhari(2013). In their study in wheat crop and reported that among the various methods of sowing(m,m2,m3 and m4). M4 gave significantly higher length of ear and number of grains per ear as compared to line sowing(m2) despite of grain yield, straw yield and harvest index under FIRBS. Sowing(m4) was lower than other methods of sowing primarily due to minimum plant population Table-3. It is evident from Table-3 the result that sowing system were significantly influenced the protein content(%) in wheat grain with the criss-cross sowing(m3) was significantly higher (11.93 and 12.02%) over amongst method of sowing.

Effect of weed control methods:-

At all crop growth stages, weed free manually(w2) recorde higher shoot density/m2, plant height, fresh and dry shoot weight, reae density, leaf area index, crop growth rate, length of ear, number grain per ear, grain and straw yield and harvest index index compared to other herbicidal treatments(Table-2 and3) which were found to be at par two clodinafop(w3). The increasment in shoot density/m2, plant height, fresh shoot weight per plant, dry shoot weight per plant, ear density, leaf area index and crop growth rate due to use of sulfo-sulfuron. To effective control of wheat significantly lower growth parameter under

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unweeded plots due to most competition offered by weed to the crop for input like nutrient, mausture, space, sunlight and smothering. Effect of wheats on crop of wheat Chopra et al(2015). Amont all weed control control method weed free manually recorded longest length of ear, number of grains per ear, grain yield, straw yield and harvest index Table-3, but were at par with clodinafop(w3) but were significantly higher than unweeded. Weed control method decrees the competition of crop plant with with weed and led to efficient use of available resource and hence better yield production Sheoeran et al(2013). Amongst weed control method showed significant higher in protein content in unweeded(w1) methods of weed control than w4>w3>w2.

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Table-1 Physical, Machanical and Chemical analysis of the experimental field

S.No.	Particulars	Value		Method of analysis
1.	Sand(%)	52.30	51.92	Bouyoucos method 1962
2.	Silt(%)	24.15	24.50	
3.	Clay(%)	18.20	18.40	
4.	Textural class	Sandyloam		Triangular method Lyan et al 1952
5.	Soil reaction	8.5	8.2	Jackson 1973
6.	Organic carbol(%)	0.33	0.33	Walkly and Black 1934
7.	Electrical conductivity	0.48	0.46	Rechards 1954
8.	Available N(Kg Ha^{-1})	175.40	152.30	Subbiah and Asija 1956

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9.	Available P_2O_5(Kg Ha^{-1})	15.25	16.30	Olsen's et al 1954
10.	Available K_2O(Kg Ha^{-1})	238.0	236.70	Jackson 1973

Table-2 Effect of method of sowing and weed control on growth attributes of wheat.

Treatments	Shoot densitym^{-1}		Plant height(cm) at heading stage		Fresh shoot weight at heading stage(g)		Dry shoot weight at heading stage(g)		Ear densitym^{-1}		Leaf area index		Crop growth rate (mm) day^{-1}	
Methods of sowing	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
Broadcasting m1	711.24	674.66	48.06	47.71	119.99	118.70	16.69	16.51	433.51	401.86	3.97	3.87	6.14	5.88
Line sowing m2	371.69	354.23	49.58	49.09	126.09	124.44	17.50	17.31	328.80	313.38	4.16	4.06	6.43	6.28
Criss cross sowing m3	1034.34	992.43	48.44	48.04	121.99	120.29	16.96	16.74	922.66	878.36	3.45	3.35	5.34	5.18
Furrow raised irrigated bed system m4	271.12	258.25	50.33	49.47	126.78	125.35	17.51	17.12	234.79	224.56	4.69	5.59	7.25	7.10
S.E.(d)	17.56	16.46	0.68	0.67	2.05	1.58	0.35	0.21	15.24	12.73	0.25	0.23	0.21	0.18
C.D.(P=0.05)	35.36	35.15	1.36	1.37	4.12	1.19	0.70	0.42	30.70	25.65	0.50	0.46	0.42	0.36
Weed control														
Unweeded w1	525.07	498.34	47.60	47.15	107.78	106.42	14.99	14.80	432.57	412.28	3.25	3.15	5.03	4.87
Weed free manually w2	639.09	607.55	50.96	50.04	130.85	129.32	18.20	17.99	578.12	550.12	4.65	4.55	7.21	7.04
Clodinafop	638.54	607.72	49.31	49.06	128.32	124.68	17.57	17.34	568.33	540.57	3.65	3.55	5.65	5.49
Sulfo-sulfuron	595.75	565.97	48.55	48.07	126.83	127.36	17.32	17.54	540.73	515.18	4.72	4.62	7.00	6.14
S.E.(d)	17.56	16.46	0.68	0.67	2.05	1.58	0.35	0.21	15.24	12.73	0.25	0.23	0.21	0.18
C.D.(P=0.05)	35.36	35.15	1.36	1.37	4.12	1.19	0.70	0.42	30.70	25.65	0.50	0.46	0.42	0.36

Table-3 Effect of method of sowing and weed control on yield attributes, yield and protein content of wheat.

Treatments	Length of ear(cm)		Number of grain(ear^{-1})		Grain yield(qha^{-1})		Straw yield(qha^{-1})		Harvest index		Protein content	
Methods of sowing	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
Broadcasting m1	7.98	7.91	39.01	38.68	40.14	39.42	61.55	59.69	39.45	39.13	11.47	11.56
Line sowing m2	8.02	7.96	39.20	38.89	41.17	39.38	62.59	60.82	39.52	39.25	11.39	11.48
Criss cross sowing m3	7.56	7.52	36.95	36.75	42.72	41.30	63.61	62.23	40.14	39.85	11.93	12.02
Furrow raised irrigated bed system	8.11	8.05	39.64	39.34	36.53	34.88	60.82	59.05	37.51	37.52	11.32	11.44
S.E.(d)	0.04	0.03	0.46	0.50	0.75	0.62	0.88	0.93	0.41	0.42	0.03	0.03
C.D.(P=0.05)	0.08	0.07	0.092	1.01	1.52	1.26	1.77	1.87	0.82	0.85	0.05	0.05
Weed control												
Unweeded w1	7.73	7.68	37.77	37.56	35.67	34.23	63.74	61.98	37.73	37.31	11.72	11.81
Weed free manually w2	8.18	8.11	39.97	39.66	42.64	41.07	63.34	61.60	40.05	39.80	11.21	11.28
Clodinafop	7.90	7.84	38.59	38.31	41.28	40.61	62.90	60.71	39.42	39.10	11.55	11.10
Sulfo-sulfuron	7.87	7.80	38.47	38.14	40.97	39.08	0.88	0.93	39.41	39.13	11.63	11.73
S.E.(d)	0.04	0.03	0.46	0.50	0.75	0.62	0.88	0.93	0.41	0.42	0.03	0.03
C.D.(P=0.05)	0.08	0.07	0.092	1.01	1.52	1.26	1.77	1.87	0.82	0.85	0.05	0.05