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Original Research Article

Influence of Weed Management Practices on Weeds, Weed Control Efficiency, Nitrogen Uptake by Weeds and the Crop, Quality and Yield of Fodder Oat (*Avena sativa* L.)

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Keywords

Green fodder yield, Crude protein yield, Weed control efficiency and Yield reduction

A B S T R A C T

The field experiment was conducted during *Rabi* season of 2017-2018at Genetics and Plant Breeding Research Farm of A.N.D. University of Agriculture & Technology, Kumarganj, Ayodhya to find out the suitable weed control measure to control weeds and enhance the nitrogen uptake by crops and fodder production in oat. The experiment was laid out in Randomized Block Design with nine treatments and replicated thrice. Comparable to hand weeding at 21 & 35 DAS, an integrated method of weed control pre-emergence application of Pendimethalin @ 0.75 kg a.i. ha^{-1} supplemented with one hand weeding at 35 DAS and Metsulfuron methyl @ 4.0 g a.i. ha^{-1} at 21 DAS + HW 35 DAS were found most promising to control the weeds and enhance the green forage yield of oat. Weed infestation during entire crop season exhibited 31.38 per cent reduction in green forage yield of oat. Herbicide applied alone either pre-emergence or post-emergence was undoubtly better than hand weeding once at 21 DAS to reduce weed infestation in fodder oat. The weeds in weedy check plot removed the highest amount of nitrogen from the soil. HW twice at 21 & 35 DAS was found most favourable to record the lowest weed density, weed biomass and highest value of weed control efficiency, nitrogen uptake by crop, crude protein yield and green fodder yield.

Introduction

The fodder production in India is insufficient to meet the requirements of growing livestock population. About 15% of the total world's livestock population (485 millions) found in India on only 2.3% of the world's geographical area. At present the availability of fodder is about 400.6 million tonnes (green fodder) and 466 million tonnes (dry fodder) against requirement is 1097 million tonnes (green fodder) and 609 million tonnes (dry fodder) which is on an average less than half of the requirement (Pal, 2016). In *Rabi* season, oat is the major cereal forage crop in India which is quick growing, palatable and nutritious for the livestock. The nutritive value of forage oat is high with dry matter digestibility in excess of 75 per cent when fed to dairy cattle (Stevens *et al.*, 2004). Its fodder, on dry matter basis contains 10.0 - 11.5 % crude protein, 22.0-23.5 % cellulose 17-20 % hemicelluloses,55-63 % neutral detergent fibre and 30-32 % acid detergent

fibre when harvested at 50 % flowering stage of crop. In India, oat covers 1.0lac ha area with productivity 481.6 q/ha green forage. The major oat producing states which cultivated oats on large scale are Uttar Pradesh (34%), Punjab (20%), Bihar (16%), Haryana (9%), and Madhya Pradesh (6%) (Chandy, 2002). The cultivation of fodder oat is more or less remunerative than grain, cash or commercial crops (Agarwal *et al.*, 2008). Weed management is not common in fodder crops because farmers considered weeds also as feeds for animals like fodder crops but in reality, weeds reduced the fodder yield up to 40 % and about 1/3 to 1/2 of applied nitrogen also utilized by the weeds which ultimately decrease the crude protein yield and fodder yield. Keeping in view the above fact, therefore, the present study was designed to evaluate the weed management practices in oat for maximize the fodder production.

Materials and Methods

The field experiment was conducted during *Rabi* season of 2017-2018 at Genetics and Plant Breeding Research Farm of A.N.D. University of Agriculture & Technology, Kumarganj, Ayodhya (U.P.).Geographically the experimental site falls under sub humid, sub- tropical climate of Indo-gangatic plains. the experimental field was texturally as silt loam, low in nitrogen (173.4kg ha^{-1}), organic carbon (0.31%), phosphorus (14.80 kg ha^{-1}) and rich in potassium (195.10 kg ha^{-1}). The reaction of soil was slightly alkaline with pH (8.59) and EC (0.38dSm^{-1}). The experiment was laid out in Randomized Block Design with nine treatments viz., T_1- Weedy check, T_2- Hand weeding once 21 DAS, T_3- Hand weeding twice 21 & 35 DAS, T_4- Pendimethalin @ 0.75 Kg a.i. ha^{-1} PE, T_5- 2,4-D @ 0.37 Kg a.i. ha^{-1} 21 DAS, T_6- Metsulfuron methyl 4 g a.i. ha^{-1} 21 DAS, T_7- Pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS, T_8- 2,4-D @ 0.37 Kg a.i. ha^{-1} 21 DAS + HW 35 DAS and T_9- Metsulfuron methyl @ 4 g a.i. ha^{-1} 21 DAS + HW 35 DAS and replicated thrice having gross plot size of 12 m^2 for each treatment. The oat cultivar variety NDO-711 (Narendra Jayee-711) was sown manuallyin rows grooved by *kudali* at spacing of 25 cm apart with seed rate of 100 kg ha^{-1}. All agronomic practices done timely. Pendimethalin and metsulfuron methyl were applied as per treatments. No weed management practices performed in weedy check plot. Observations were taken timely from 8.75m^2 net plot area for each treatment and crop harvested at 50 % flowering stage.

Results and Discussion

Effect on weeds parameter

By and large, all manual, chemical and their integration were found superior to weedy treatment to reduce weed counts and weed biomass per unit area. Hand weeding twice at 21 and 35 DAS which is at par with pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS and Metsulfuron methyl @ 4 g a.i. ha^{-1} 21 DAS + HW 35 DAS proved superiority over other treatments in reducing weed density. The minimum dry weight of weeds was recorded with hand weeding at 21 & 35 DAS and pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS which observed significantly superior than all the treatments. Hand weeding twice at 21 and 35 DAS was registered the highest WCE (89.47%) closely followed by pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS (86.97%).Weed infestation during entire crop season exhibited 31.38 and 30.21 per cent reduction in green forage yield of oat compared with green forage yield recorded in hand weeding at 21 & 35 DAS and pre-emergent pendimethalin @ 0.75 kg a.i. ha^{-1} supplemented with one hand weeding at 35 DAS, respectively. The minimum nitrogen uptake by weeds 3.39 kg ha^{-1} and 4.24 kg ha^{-1}

were recorded with hand weeding at 21 and 35 DAS and pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS, respectively which were at par and significantly lower than all the treatments due to low density of weeds. The weeds existed in weedy treatment removed more nitrogen from the field by 39.71 kg ha^{-1} at harvest stage. The results are in close conformity with the findings of Singh *et al.*, (2001), Singh *et al.*, (2013), Pisal and Sagarka, (2013) and Raja (2013).

Table.1 Effect of weed control practices on weed density, weed biomass, weed control efficiency, weed index and nitrogen uptake by weeds

Treatments	weed density ($no.m^{-2}$)	weed dry weight ($g\ m^{-2}$)	Weed control efficiency (%)	Weed index (%)	N uptake by weeds ($kg\ ha^{-1}$)
Weedy check	(309.67) 17.60	(342.31) 18.50	-	31.38	39.71
Hand weeding once 21 DAS	(114.33) 10.70	(153.20) 12.38	55.24	23.99	17.47
Hand weeding twice 21 & 35 DAS	(40.67) 6.41	(36.05) 6.04	89.47	-	3.39
Pendimethalin @ 0.75 Kg a.i. ha^{-1} PE.	(94.67) 9.74	(101.77) 10.10	70.27	17.73	11.09
2,4 – D @ 0.37 Kg a.i. ha^{-1} 21 DAS	(108.33) 10.40	(139.30) 11.82	59.31	21.54	15.46
Metsulfuron methyl 4 g a.i. ha^{-1} 21 days	(100.33) 10.03	(120.89) 11.00	64.68	19.63	13.30
Pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS	(46.67) 6.84	(44.61) 6.71	86.97	1.68	4.24
2,4-D @ 0.37 Kg a.i. ha^{-1} 21 DAS + HW 35 DAS	(77.67) 8.83	(89.92) 9.51	73.73	12.20	8.81
Metsulfuron methyl @ 4 g a.i. ha^{-1} 21 DAS + HW 35 DAS	(57.00) 7.58	(69.42) 8.36	79.72	6.04	6.66
SEm ±	0.42	0.33	-	-	0.73
C.D. at 5%	1.25	0.99	-	-	2.19

Table.2 Effect of weed control practices on green fodder yield, dry fodder yield, crude protein yield and nitrogen uptake by the crop

Treatments	Green fodder yield (kg ha^{-1})	Dry fodder yield (kg ha^{-1})	Crude Protein yield (kg ha^{-2})	Nitrogen uptake (kg/ha)
Weedy check	36069.29	8407.89	646.44	103.43
Hand weeding once 21 DAS	39953.45	9394.78	731.36	117.02
Hand weeding twice 21 & 35 DAS	52564.25	12762.17	1032.82	164.38
Pendimethalin @ 0.75 Kg a.i. ha^{-1} PE.	43242.50	10291.29	801.35	128.21
2,4 – D @ 0.37 Kg a.i. ha^{-1} 21 DAS	41241.36	9774.57	761.61	121.86
Metsulfuron methyl 4 g a.i. ha^{-1} 21 days	42244.83	10054.41	783.24	125.31
Pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS	51681.72	12406.08	992.24	158.76
2,4-D @ 0.37 Kg a.i. ha^{-1} 21 DAS + HW 35 DAS	46150.04	11027.13	875.42	140.06
Metsulfuron methyl @ 4 g a.i. ha^{-1} 21 DAS + HW 35 DAS	49391.50	11843.19	948.53	152.60
SEm ±	2112.48	512.99	28.21	4.13
C.D. at 5%	6333.21	1537.93	84.57	12.39

Effect on plant parameter

The highest green fodder yield was recorded with hand weeding at 21 & 35 DAS and being at par with pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS and both were recorded significantly superior than weedy check. Among the herbicide applied alone, pendimethalin @ 0.75 Kg a.i. ha^{-1} PE had highest green forage yield followed by metsulfuron methyl 4 g a.i. ha^{-1} 21 DAS. The dry forage yield varied significantly among the different weed control treatments. The maximum dry forage yield recorded from hand weeding at 21 and 35 DAS and it was at par with pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS and found significantly superior to weedy check. The maximum uptake of nitrogen by crop was recorded by hand weeding at 21 and 35 DAS (164.38 kg ha^{-1}), however, being at par with pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS and metsulfuron methyl @ 4 g a.i. ha^{-1} 21 DAS + HW at 35 DAS, which recorded 158.76 Kg ha^{-1} and 152.60 Kg ha^{-1}, respectively and all were significantly superior than weedy check (control). It might be due to less competition with weeds in above treatments than weedy check. Significantly highest crude protein yield was recorded by hand weeding at 21 and 35 DAS. However, it was at par with

pendimethalin @ 0.75 Kg a.i. ha^{-1} PE + HW 35 DAS and metsulfuron methyl @ 4 g a.i. ha^{-1} 21 DAS + HW 35 DAS. Similar results have also been reported by Bhilare *et al.*, (2001) and Jat *et al.*, (2004).

References

Agarwal RK, Kumar S, Tripathi RK. Sharma RK and Singh KA. 2008. Agro-economic analysis of fodde based cropping system. Indian Journal of Fertilizers 4(4): 121-31.

Bhilare, R.L., Desale, J.S., Pathan, S.H., Toradmal, B.S. and Patil, V.S. (2001). Integrated weed management in oat. *Journal of Maharashtra Agricultural Universities* 26(1):43-44.

Chandy, K.T. (2002) Low cost booklets on crop production, Animal husbandry, Environment, Natural resource management and Product value addition. *Cereals and millets Production* CMPS – 7. Booklet No. 245. Oats. Indian Social Institute, New Delhi.

Jat, A.S., Dadheech, R.C., Ram, B. and Jat, M.L. (2004). Effect of herbicides, phosphorus and phosphate solubilizers on growth, yield and weed control efficiency of wheat in Central Plateau and Hills zone of India. *Indian Journal of Agronomy*, 49(1): 53-56.

Pal, M.S. (2016) Prospects of forage-based crop diversification. Souvenir National Group Meet-Kharif -2016 of ICARP on forage crops SKUAST Srinagar.16-17. pp.112-118.

Pisal, R.R., Sagarka, B.K. and Babulal, M. (2009). Efficacy of new herbicides in wheat under south Saurashtra region of Gujarat. *Indian Journal of Weed Sciences*, 41(1 & 2): 109-110.

Raja, W. (2013). Suitable cropping system and weed management practices for higher fodder oat production. *Indian Journal of Weed Science*, 45(3): 201–203.

Singh, G. and Singh, V.P. (2005). Compatibility of clodinafop-propargyl and fenoxaprop-p-ethyl with carfentrazone-ethyl, metsulfurom methyl and 2,4-D. *Indian Journal of Weed Science*,37(1 & 2): 1-5.

Singh, M.M., Singh, A.K. and Singh, S.P. (2001). Integrated weed management in forage oat (*Avena sativa*). *Indian Journal of Agricultural Sciences*, 71(8):556-557. 3 ref.

Singh, R.K., Singh, S.R.K. and Gautam, U.S. (2013). Weed Control Efficiency of Herbicides in Irrigated Wheat (*Triticum aestivum*). *Indian Research Journal of Extention and Education*, 13(1).

Stevens, E. J., Armstrong, K. W., Bezar, H.J., Griffin, W. B. and Hampton J.G. (2004) *Fodder Oats: An Overview*oat, 596.pdf