Effect of variable densities of Phalaris minor and wheat (*Triticum aestivum L.*) on their growth parameters

1st Mamta lecture in Baba farid school Bathinda

Abstract:

A field experiment was conducted at crop research farm, Department of Agronomy, college of agriculture, Selaqui, Dehradun during winter season of 2015-16. The data on growth parameters revealed that wheat crop sown at higher density (150 Kg/ha seed rate and 15 cm row spacing) gave maximum suppression affect on growth parameters such as leaf area index, tillers and seed yield of *Phalaris minor* and produced higher leaf area index and number of tiller per unit area. The suppression effect of *Phalaris minor* densities on wheat leaf area index and tillers increased with the increase in population m^{-2} of *Phalaris minor*.

Keywords: Wheat, *Phalaris minor*, planting density, Row spacing.

Introduction:

In general, weed interference is a barrier to successful crop production (Afifi and swanton.,2012) crops are subject to interaction with other plant species with similar ecology niches. Such interactions with different plant species or populations from the same species are called interference. This interference may exhibit a positive, negative, or neutral nature depending on the species involved (Radosevich.,1987).

The ability of a species to interfere with another is related to several factors, including the plant species, the population density, the time of emergence of one species compared to another, and the plant characteristics (Radosevich.1987, Bianchi, Fleck and Lamego.,2006). The effect of weeds on crops is not only due to their greater individual competitive ability but also to the total plant population (Vila, Williamson and Lonsdale.,2004).

As the factors that influence the competition process are understood, the level of suppression and weed control can be determined with greater confidence, which would lead to the development of management strategies that result in reduced costs and higher yield (Fleck et al., 2006). Weeds are undesirable on account of their competitive and allelopatheic behavior and providing habitants for harmful organisms (Zaman *et al*., 2011). weeds cause more loses to agriculture then all Pest (Gella *et al*., 2013).Keeping this character of competition among plants this study related to the effect of densities of Wheat and *Phalaris minor* was under taken to study their effect on each other.

Materials and methods:

The field investigation was conducted during winter season of 2015-16 at the Research area, Department of Agronomy, College of Agriculture, Selaqui, Dehradun, Uttarakhand, which is located at **(**20.78”N, 52’27.08”E with 515.54m altitude) above sea leavel. The soil of the experimental field was sandy loam in texture, medium in organic carbon and low in available nitrogen medium in available phosphorous, available potash and low in available zinc with alkaline in reaction. The experiment was laid out in split plot desion by keeping two seed rates (100 and 150kg ha^{-1}) and two row spacings (15cm and 22.5cm) of wheat crop in main plots and seven densities of *Phalaris minor* (0,10,20,40,80,160 and 320 plants m^{-2}) in sub plots. The data ON leaf area index (LAI), tillers per unit area and seed yield per plant was recorded for *Phalaris minor* where as the data onLAI and tiller number per unit area was observed for wheat.

TABLE-1 Effect of variable density of Wheat on growth parameters of *Phalaris minor*

Results and discussion:

Effect on *Phalaris minor* – The data presented

Treatments	***Phalaris minor* LAI**		**Final Tillers (m-2) and seed yield g/plant of Phalaris minor**	
Seed rate (Kg h-1)	60	90	Final Tillers (m-2)	*Phalaris minor* seed yeild (g/plant)
100	0.72	2.91	21.11	0.51
150	0.5	2.23	20.01	0.46
CD (5%)	0.12	0.43	0.59	0.03
Row Spacing (cm)				
15	0.51	2.45	19.88	0.47
22.5	0.58	2.96	20.07	0.5
CD (5%)	NS	0.36	1.85	0.03
Weed density (*Phalaris minor*/ m^2)				
0	0	0	0	0
10	0.27	0.67	10.03	0.46
20	0.37	1.61	14.5	0.47
40	0.46	2.91	19.66	0.48
80	0.51	3.24	29.36	0.52
160	0.69	3.67	40.35	0.56
320	0.84	4.58	42.28	0.58
CD (5%)	0.01	0.06	2.45	0.01

Table-1

revealed that both recommended seeding rate and spacing (100kg/hac and 22.5cm) resulted in significantly higher leaf area production by *Phalaris minor* compared to closer spacing of 15 cm. And higher seed rate (150kg/ha) of wheat crop. This showed the suppression effect of higher population of Wheat on *Phalaris minor*. *Phalaris minor* tillers were significantly reduced in higher seed rate (150 Kg ha^{-1}) as compared to recommended seed rate (100 kg ha^{-1}). The reduction in number of final tillers was 5.21 per cent at higher seed rate as compared to recommended seed rate. The reduction in number of tillers may be attributed to the thick crop density at higher seed rate as compare to recommended seed rate, which resulted in more smothering effect on weeds under their crop canopy and provided less space for growth and development of weeds. Closer row spacing of 15 cm also significantly reduced the final tillers. (m^{-2}) as compared to the normal row spacing (22.5). There was 11 % reduction in number of tillers at closer spacing as compared to normal spacing. As the *Phalaris minor* population (density) increased there was increase in the number of tillers m^{-2}. The highest density of 320 plants m^{-2} recorded the highest number of tillers m^{-2}. The Number of tillers at 320 plants m^{-2} were significantly higher than densities of 10, 20, 40 and 80 plants m^{-2} .The trend was similar with effect of seed yield per plant by *Phalaris minor* (Table-1)

TABLE-2 Effect of variable densities of *Phalaris minor* on growth parameters of Wheat crop.

Treatment	Emergence (plants m^{-2})	Days after sowing Leaf area index		No. of tillers m^2 DAS	
Seed rate (Kg h^{-1})		60	90	60	90
100	209	167	2.53	487	467
150	222	1.94	3.05	505	494
CD (5%)	7.44	0.06	0.24	6.9767	7.35
ROW SPACING(cm)					

15	213	1.92	2.93	505	492
22.5	211	1.74	2.69	487	468
CD (5%)	NS	0.04	0.05	3.877	10.35
Weed density (*Phalaris minor* m^2)					
0	230	2.73	4.11	632	610
10	219	2.13	3.83	588	579
20	216	2.04	3.38	561	536
40	218	1.83	3.23	507	481
80	217	1.53	2.72	481	456
160	215	1.21	2.15	429	418
320	206	1.12	1.71	384	357
CD (5%)	NS	0.01	1.13	14.56	14.32

DAS=days after sowing

EFFECT ON CROP

The perusal of data indicated that crop emergence was uniform under all the treatments except (Table-2) some variation due to difference in seed rates of wheat.

At higher seed rate (150 Kg ha-1) recorded significantly higher LAI as compared to recommended seed rate (100 Kg ha^{-1}) at both the stages. Closer row spacing of 15 cm gave higher LAI at all stages over normal row spacing of 22.5 cm. The results corroborates to the findings of Brar and singh 1997 and Angiras and Sharma 1996 that due to thick plant stand closer row spacing increased LAI of wheat over rider row spacing.As the the *Phalaris minor* density increased from 10 plants m^{-2} to 320 plants m^{-2} ,The LAI reduce significant Similarly, Singh *et al.,* (2000) observed a linear decrease in wheat leaf area index in wild oats density in a additive series experiment indicating thereby the aggressive of weeds at high population pressure. The data (Table-2) showed that number of tillers were significantly higher at higher seed rate (150 Kg ha^{-1}) as compared to recommended seed rate (100 Kg ha^{-1}) at both the stages of observation. Spacing of 15 cm recorded significantly higher number of tillers as compared to normal spacing (22.5 cm) In closer row spacing the increase in number of tillers at 60 and 90 DAS was 3.56 per cent and 4.87 per cent respectively over normal spacing 22.5 cm.

The increased density of *Phalaris minor* gradually decreased the number of tillers and the reduction in the number was significant in treatments (10, 20, 40, 80 and 320 plants m^{-2}) as compared to weed free plot. The maximum number of tillers were recorded in weed free situation and minimum at *Phalaris minor* density of 320 plants m^{-2}.

Conclusion:-

The studies on the competitive ability of wheat and *Phalaris minor* in relation to their variable density revealed that higher density of wheat as well as of *Phalaris minor* showed adverse effect on growth and development of each other. Higher density of wheat has suppressing effect on *Phalaris minor* and higher density of *Phalaris minor* has adverse effect on growth and development and ultimately yield of wheat crop.

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