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Competitive Ability of Variable Levels of Kandyali Palak *(Rumex spinosus)* with Wheat (*Triticum aestivum* L.)

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ABSTRACT

The dry matter of Kandyali palak (*Rumex spinosus*) tended to increase with the increase in its population, whereas wheat grain yield showed negative correlation with population. On an average of two years, presence of one plant m^{-2} of *R. spinosus* reduced grain yield by 2.5% and two and three plants m^{-2} by 6.1 and 20.1%, respectively. Further 30.1, 49.0 and 116.1% reduction in grain yields was recorded with 5, 10 and 30 plants m^{-2} of *R. spinosus*.

INTRODUCTION

Kandyali palak (*Rumex spinosus*) is a newly emerging weed of wheat in Punjab particularly on light to medium textured soils (preferably in non-paddy rotation). This weed is very succulent during initial stages and later on with the advancement in growth stage, it becomes very hardy and lot of spines appear particularly on floral parts. This weed is very vigorous, highly competitive, highly branched and very deep rooted. Apart from competing with growth factors, this weed due to its spiny nature also interferes with harvesting and threshing of wheat. Severe infestation of this weed is also responsible for forceful lodging of the wheat crop, which results in severe losses in grain yield. Also quality of the produce gets deteriorated due to the presence of spiny fruits containing seeds of this weed in the produce which are of same size as of wheat grains.

Reduction in wheat grain yield is dependent upon type of weeds and their density (population). So, present studies were conducted to estimate the extent of losses due to the infestation of variable densities of *R. spinosus*.

MATERIALS AND METHODS

Field experiment was carried out at the experimental area of the Department of Agronomy and Agrometeorology during 2001-02 and 2002-03 crop season on loamy sand soil with 90.2, 6.8 and 3.0% of sand, silt and clay, respectively. The experimental field was heavily infested with natural population of *R. spinosus*. PBW 343, a popular wheat variety, was sown on November 2, 2001 and November 12, 2002 with single row hand drill by keeping row to row spacing of 22.5 cm and by using constant seed rate i. e. 100 kg ha^{-1}. Plots measuring one sq. m area were prepared before applying the first irrigation to the crop. Density of *R. spinosus* plants was maintained by thinning out the extra seedlings and retaining 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25 and 30 plants per m^{-2}, 30 days after sowing the wheat crop. This operation was repeated later on after 15 days in order to uproot newly emerged weeds, if any. Experiment was laid out in randomized block design with four replications and 15 treatments (Table 1).

The relationship between *R. spinosus* density and wheat grain yield was described by using the following exponential model :

$$Y = a.exp^{-bx}$$

Where,

Y=Wheat grain yield (q/ha).

a=Estimate of wheat grain yield in the absence of *R. spinosus*.

b=Estimate of the rate of reduction in wheat

Table 1. Influence of variable density of *Rumex spinosusn* on grain yield of wheat

Density of *R. spinosus* (No. m^{-2})	Dry matter of *R. spinosus* (kg ha^{-1})			Grain yield of wheat (kg ha^{-1})		
	2001-02	2002-03	Mean	2001-02	2002-03	Mean
0	0	0	0	5837	5450	5644
1	337	275	306	5902	5100	5506
2	412	325	369	5687	4950	5318
3	562	812	687	4650	4750	4700
4	700	1437	1068	4500	4700	4600
5	750	2037	1394	4087	4587	4337
6	800	2125	1463	3737	4362	4100
7	1155	2500	1828	3812	4212	4012
8	1650	2812	2231	3862	4287	4075
9	1812	3000	2406	3537	4175	3856
10	2862	3262	3062	3287	3900	3594
15	3137	3812	3475	3262	3812	3537
20	3925	4812	4369	2737	3625	3181
25	4927	5812	5375	2287	3512	2900
30	5762	6000	5881	1912	3312	2612
	405	876		587	791	

grain yield as infestation of *R. spinosus* increases.

x=*R. spinosus* density or biomass.

The model was fitted to the data using CS 13 statistical package.

RESULTS AND DISCUSSION

With the increase in density of *R. spinosus,* the grain yield of wheat decreased substantially (Table 1). The grain yield of wheat free from *R. spinosus* was highest and was at par with one to two plants m^{-2}. Lowest grain yield was recorded in highest intensity treatment (30 plants m^{-2}), which was at par with 25 plants m^{-2} during 2001-02 and to 10, 15, 20 and 25 plants m^{-2} during 2002-03. On an average of two years, the presence of 5, 10 and 30 plants of *R. spinosus* m^{-2} decreased wheat grain yield by 30.1, 49.0 and 116.1%, respectively than weed-free plot. Dry matter of *R. spinosus* increased with increase in its density and the presence of 5, 10 and 30 plants m^{-2} increased dry matter by 356, 901 and 1822% as compared to presence of only one weed plant m^{-2}.

Relationship between wheat grain yield and weed density fitted well the exponential model. Grain yield reduced substantially due to *R. spinosus* competition. Reduction trend in wheat yield with increasing *R. spinosus* density was almost similar during both the years. The response curve obtained

Table 2. Regression estimates of wheat grain yield response to increasing densities and dry weight of *Rumex spinosus*

Year	a	b	d. f.
Grain yield vs. weed density			
2001-02	5268	0.9233 (0.035)	14
2002-03	4947	0.8929 (0.015)	14
Grain yield vs. weed dry weight			
2001-02	5567	0.9541 (0.017)	14
2002-03	5081	0.9531 (0.016)	14

Figures in parentheses are S. Es of the estimate.

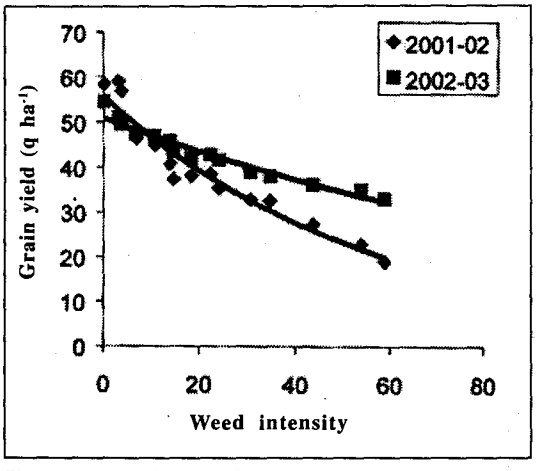

Fig. 1. Effect of population of *Rumex spinosus* on grain yield of wheat : Grain yield vs. weed density.

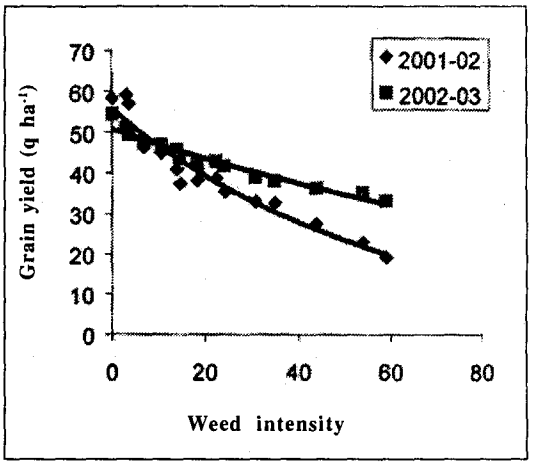

Fig. 2. Effect of population of *Rumex spinosus* on grain yield of wheat : Grain yield vs. dry weight.

during first and second year was relatively uniform with slopes ranging from 0.9233 to 0.8929 for grain yield v/s weed density and from 0.9541 to 0.9531 for grain yield v/s dry matter (Table 2, Figs. 1 and 2).