Pak. J. Agric. Sci. Vol. 29, *No.* 1, 1992

A CULTURAL APPROACH TOWARDS CONTROL OF BERSEEM ROOT ROT

A.R. Chaudhry, Inam-ul-Haq & Nadeem Rehman
Fodder Research Institute, Sargodha

In a 2-year study conducted during 1985-87, berseem reaction to root rot was studied in a sequence of crop plantings, The infection was only 17.22% when berseem was followed by sorghum compared to 57.79% where bersecm was followed by bcrsecm. This increased infection was probably due to the build up of the inoculum of root rot pathogens in continuous plantings. Green fodder yield was 53.67% higher where crop was followed by cotton as against a rotation where preceding crop was again a berseem. The study recommended berseem planting for higher green fodder yield and less root rot infection after cotton, cowpea, maize and sadabahar,

INTRODUCTION

Berseem *(Trifolium alexandrinum* L.) as a multicut nutritious fodder is of paramount importance among rabi Iodders extensively cultivated in irrigated tracts of Pakistan. ILs average forage yield is estimated around 60 t ha⁻¹ against maximum potential being 100-150 t ha⁻¹. Among the factors responsible for this yield gap, berscern root rot is considered to play a major role. The extent of damage tends to touch the range of 20-25% if the temperature range of 20-25° C prevails for a short period after incessant precipitation. Bersecm root rot is a complex disease incited by three most virulent pathogens, viz. *Rhizoctonia solani, Fusarium tnonilifonne* and *Sclerotium bataticola* (Jobshy *et al.,* 1981).

The first sign of the disease is evidenced by the drooping and morbidity of one or two tillers of the affected plants under favourable conditions where it appears in the form of definite patches. Akhtar (1980) reported that severe mortality in berseem crop was observed during February and March in the fields naturally infested with the pathogen *Rhizoctonia solani.* The chemical control of the disease is possible but may involve hazards of microbial mortality, animal toxicity and uneconomical use. The other possible way-out lies in the cultural approach. Crop rotation against the clover root rot is one of the main components of agronomical and farm management control measures in USSR (Karavianskii, 1978). To avoid forage loss due to clover disease viz. clover rot and clover scorch, right alternation of the crop is the only feasible device (Latch, 1984).

In view of the economic losses in the crop, a cultural experiment was planned to rotate berseem as a succeeding crop in eleven harvested fields previously sown under different crops to search out the suitable rotation ensuring maximum control of the disease causing forage losses at the farmers fields.

MATERIALS AND METHODS

The promising bcrsecm cultivar "Agaitti berscem" was planted in eleven harvested fields previously sown with sorghum B.N. hybrid, sadabahar, collon, lucern, rice,

maize, oats, bajra, COwpeas and berseem (check field). The trial was laid out in randornizer} complete block design with four replications having net plot size of 3 X 6 m at Fodder Research Institute, Sargodha during 1985-86 and 1986-87.

meter each in all the treatments. The observations regarding disease incidence percentage were noted after each cut by counting the affected plants in randomly selected sampling points (Nagarajan, 1983). A plant was considered to be affected if more than

Table 1: Percentage of incidence of root rot in berseem

Treatment	Root rot incidence percentage			Decrease over check (%)
	1985-86	1986-87	Average	
Ikrseem after sorghum	18.90	15.54	17.22	40.57
Bcrsccrn after RN. hybrid	21,87	21,85	21,86	35.93
Berseem after Sadabahar	25.09	19.48	22.28	35.51
Berseem after Collon	27.69	18,30	22.99	34.80
Berseem after Rice	38.74	25.70	32.22	25.57
Berseem after Lucern	35.72	30.91	33,31	24,48
Berseem after Maize	41,52	31.57	36.54	21,25
Bersccm after Oats	48.29	25.00	36.64	21,15
Bcrsccm after l3ajra	50,I6	37.19	43.67	14.12
Berseem after Cowpeas	60.96	40.J(,	50.56	7.23
Berseem after l3erseem (check)	67,19	48.31)	57.79	
L.S.D.%	5.77	4.67		
L.S.D. %	7.78	6.30		

All the treatments were uniformly fertilized with a normal dose of 112-22-0 NPK, kg ha-I. The seed at the rate of 20 kg ha-I was sown by broadcast method in standing water. A total of twelve irrigations as per requirement of the crop were applied during the crop season. Four cuts of green fodder in all at an interval of 45-60 days starting from middle of December to the end of April during 11)85-86 and 11)86-87 were obtained. The data regarding forage yield were recorded after each cutting. The observations on root rot incidence Were also recorded by random sampling technique, taking two random sampling points of 1 sq. half of its tillers Were dead. The disease incidence and forage yield data were analyzed statistically employing analysis of variance and L:S.D. tests (Steel and Torrie, 1960) at P>0.05 and P>O.Ollevels of significance.

RESULTS AND DISCUSSION

a. Root rot incidence: The differences in root rot incidence levels due to the treatments were statistically significant (Table 1). The data on disease incidence revealed that the treatment bcrsccm after bcrscem (check) had the highest level of root rot incidence i.c. 67.19% and 48.39% during 11)85-

out as the most effective control measure against berseem root rot disease.

b. Green fodder yield: The differences in green fodder yield among treatments were highly significant (Table 2). The data revealed that the treatment berseem after cotton out-yielded the other treatments with the maximum fodder yield of 99.69 t ha-I, averaged over two years. The lowest outturn of 64.78 t ha-I was obtained from the treatment of berseem after berseem. The increase in fodder yield in berseem after cotton treatment might be due to lower disease incidence observed in this treatment (22.99%). On the contrary, the highest root rot incidence of 57.79% observed in berseem after berseem treatment resulted in the lowest forage yield. Whereas berseem after sorghum despite minimum disease attack gave low forage yield than berseem after cotton. The low yield in berseem after sorghum may be due to depletion of the nutrients in upper surface by the preceding shallow-rooted sorghum crop, leaving liule nutrients for the succeeding surface feeder berseem crop.

In similar experiments on wheat, Susidko *et al.* (1987) reported that sowing wheat three or four years in succession reduced the crop yield by one third to one half. They obtained 10.8 quintals ha^{-1} wheat yield in monoculture whereas yield of wheat planted after clover, peas and corn ranged from 26.7 to 31.7 quintals ha^{-1}.

In view of the results obtained, it could safely be concluded that for higher green fodder yield and lower disease incidence, berseem may be planted after cowpea, maize and sadabahar. Where build up of inoculum is recorded high in the soil, the berseem could safely be rotated where preceding crops were RN. Hybrid and sadabahar.

REFERENCES

Akhtar, C.M. 1980. Discovery of antagonistic fungal organisms to control plant diseases and to enhance the yield of crops. p. 17-18. In: Hafeez, S. Ed. Pak. Agric. Book, Press Corp. Pak. Karachi.

Jobshy, Z.M., E.l. Syed, A. Rammah and MA. Satter, 1981. Pathogenicity and control of three fungi associated with damping off and root rot of Egyptian clover *Trifolium alexandrnum*. Res. Bull. No. 1674, p. 14.

Karavianskii, N.S. 1978. Use of integrated systems in plant protection-fodder crops. p. 250-268. In: Fadeev and Novozhilo. Integrated plant protection. Oxonian Press Pvt. Ltd., New Delhi, India.

Latch, G.C. 1984. Importance of diseases in herbage seed production. p. 36-40. In: Lan-cashire, (ed.) Herbage seed production New Zealand Grassland Association, Palmerston North.

Nagarajan, S. 1983. Plant Diseases Epidemiology. 2nd Ed. Oxford & IBH Pub. Co. Inc., New Delhi.

Roberts, D.A. and C.W. Boothroyd. 1975. Fundamentals of Plant Pathology. W.H. Freeman & Co. Inc., USA.

Steel, R.G.D. and J.H. Torrie. 1960. Principles and Procedures of Statistics. McGraw Hill Book Co. Inc., NY, USA.

Susidko, P.I., V.F. Peresypkin, PA. Areshnikov, P. Grigorov and C. Kania. 1987. Use of integrated systems in plant protection-cereal crops. p. 228-239. In: Fadeev, LV.N. and K.V. Novozhilov (ed.). Integrated Plant Protection Oxonian Press Pvt. Ltd. New Delhi.