RICE ALLEOPATHY: GROWTH OF *TRIANTHEMA MONOGYNA* IN THE PRESENCE OF DECOMPOSING RICE STRAW

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ABSTRACT: *Weeds need almost the same growth conditions as does the crops and this result in inter-specific competition causing huge losses in the yield of economic crops. To minimize such losses different weed control stretegies are being employed by the farmers. Keeping in view the role of allelopathy in weed control, residual rice allelopathy was exploited for the management of Trianthema monogyna during a field trail.*

Key words: Weed control, allelopathy, rice allelopathy, *Trianthema monogyna*

INTRODUCTION

The losses in crop yield due to weeds vary with the type and intensity of infesting weeds in a particular crop. Weeds like *Cyperus rotundus, Agropyron repens* and *Trianthema portulacastrum can* reduce the germination and growth of many crops by root production of phytotoxic substances [1]. In addition weeds also harbour many insects and diseases, reduce the market value of crops, interfere with the seed certification standards, impart objectionable odour and flavour to the flour, increase the cost of crop cultivation, interfere the harvesting and threshing operations and are responsible for crop lodging [2,3]. For successful crop cultivation seed control therefore becomes essential and many methods are in use of the growers to get rid of this manace. With the discovery of the role of allelopathy and cover crops in weed control many crops like rice which produces a large amount of straw are getting attention. A major portion of such agricultural wastes goes to burning causing a great hazard to public health and environment. [4] estimated that about 90% of all rice farmers in Philippine burn the straw, which is produced about 8.17 million annually. In Egypt, the problem is getting more serious due to an increasing demand of their people for rice grain as staple food. It produces nearly 4 billion tons of rice straw /annum [5]. A large amount of such wastes is being consumed in composting and feeding animals for being cheap and abundant [6].

The use of rice straw in mulching practices for controlling weeds in different crops have been suggested by [4] which also benefits for N fixation by heterotrophic N-fixing micro-organisms, for succeeding crop. Recently, [7] revealed that allelopathic cultivars of rice can control both mono and dicot weeds under field conditions. Keeping this very promising aspect of rice allelopathy the present investigations were carried out to control *Trianthema monogyna,* a weed of maize crop during which it was grown in field plots with and without rice mulchings of different regimes.

MATERIALS AND METHODS

SELECTION CULTIVATION AND MULCHING OF SELECTED RICE VARIETY

A large number of rice varieties are being cultivated in Pakistan, however, only few of them are almost sown throughout the country. Out of these varieties Basmati super was selected for the present study. Morphologically healthy and viable seeds of this rice variety were sown in nursery beds and grown for forty days. Then rice seedlings, were transplanted into triplicate field plots and grown to matuarity with regular hand weeding and irrigation .At maturity rice ears were picked and the vegetative plant was cut at three levels in triplicate plots, uprooted and mixed in to the soil and was labeled as 25%, 50% and 75%. The plots for control were without any rice mulching. These plots were then used for field trials with *Trianthema monogyna.*

CULTIVATION AND GROWTH MONITORING OF SELECTED WEED

The healthy and viable seeds of *Trianthema monogyna,* were subjected to field trials in triplicate plots with and without rice mulching as follows

Trianthema monogyna alone (control)
Trianthema monogyna-25% Rice mulching
Trianthema monogyna-50% Rice mulching
Trianthema monogyna-75% Rice mulching

The growth of the corps was regularly monitored till maturity and divided into three main phases and harvested thrice to include all important morphological characters. The growth of the grown weed was recorded in terms of, shoot and roots, length, fresh and dry weights at the three growth stages.

STATISTICAL ANALYSI

All the data recorded during this study was than subjected to statistical analysis by applying Anova and Duncun's multiple range tests (Steel and Torrie, 1980).

RESULTS AND RESULTS

Shoot Growth in Length

The data on shoot growth of *T. monogyna* assessment (Fig.1a) revealed that this weed exhibited very profound growth in terms of shoot height achievement from the early phase in non-mulch condition, the germination and thereby consequent growth. Shoot length of *T. monogyna* was shortened significantly in all the treatments under rice mulching at three growth stages (Table.1). Interaction of growth stage x mulch concentration and weed x mulch concentration remained significant.

Shoot Biomass Production

Maximum shoot fresh and dry biomass increments by *T. monogyna* were exhibited from 90-120 days growth. Early growth and high biomass production upto 120 days clearly indicates that weed-crop competition would be maximum during this growth stage (Fig.1b,c). Analysis of variance of data on shoot fresh and dry weight revealed significant decrease in all the treatments under various levels of rice mulching at three growth stages. All the interactions among the sources of variance remained significant (Table1). Similar allelopathic influence of remaining debris of several crops has also been reported ealier by several workers [9,10,11].

Root Growth in Length

Root growth data only represent assessment in non-mulch control (Fig.2a).

The pattern of root growth was similar to that exhibited for shoot growth. Root growth in length increased sharply upto 120 days and showed negligible increments in the final growth phase. Rice mulching reduced the root length significantly at different growth stages. Most of the interactions remained in significant (Table 1).

Root Biomass Production

Root fresh biomass of weed gradually increased from 0.25gm to 0.55gm during 90-120 days growth. Similar to shoot fresh weight, root fresh weight exhibited significant reduction in all the treatments at three growth stages under various concentrations of rice mulch regimes. All the interactions among the sources of variance remained significant (Table 1).

Maximum root dry biomass, however, was attained upto 120 day stage and it declined marked at the final assessment phase of 150 days (Fig.2b,c). Effect of rice mulching on root fresh weight remained significant in all the treatments (Table 1). Most of the

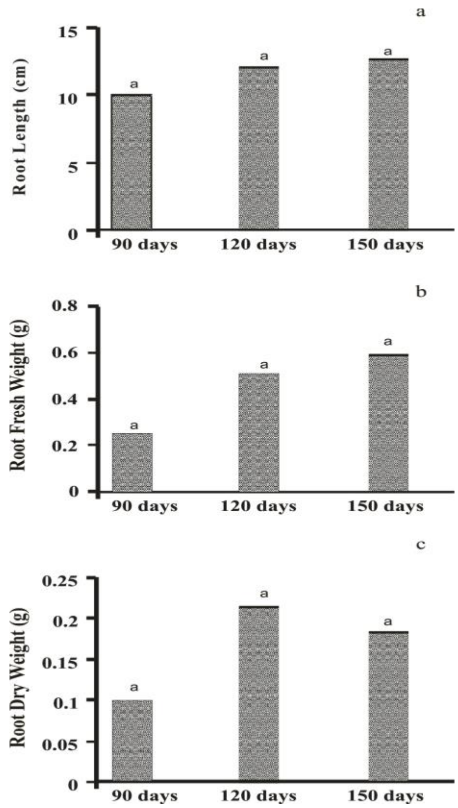

Fig. 1: Effect of rice mulching on (a) shoot length (b) shoot fresh weight (c) shoot dry weight Of *T. Monogyna*

interactions studied were significant. Parallel to present findings several crops with inhibitory effects on weed growth has been reported [12].

Vertical bars with different letters show significant difference (P≤0.05) as determinants by DMR test

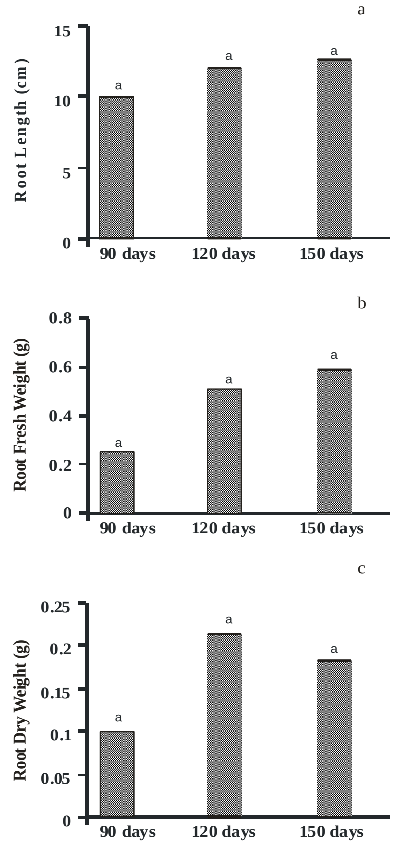

Fig. 2: Effect of rice mulching on (a) root length (b) root fresh

weight (c) root dry weight of *T. Monogyna*

Vertical bars with different letters show significant difference (P≤0.05) as determinants by DMR test.

Table 1: Analysis of variance (mean squares) for various growth characters in *Trianthema monogyna* as affected by rice mulch and maize competition at three growth stages.

Source of variance	df	Mean Square					
		Shoot length	Shoot fresh wt.	Shoot dry wt.	Root length	Root fresh wt.	Root dry wt.
Treatments	23	2460***	524***	14***	69***	0.107***	1***
Growth stage (G)	2	126***	168***	4***	3**	3***	4***
Weeds (W)	1	1404***	542***	16***	2 ns	2***	3***
Mulch conc.(C)	3	16653***	2790***	76***	52***0	0.660***	9***
G×W	2	11 ns	22*	1*	9 ns	1***	5 ns
G×C	6	126***	168***	4***	3***	3***	4***
W×C	3	1404***	542***	16***	2 ns	2***	3***
G×W×C	6	11 ns	22**	1**	9 ns	1***	5*
Error	48	7	7	0.265	0.698	4	2
Total	72						

*, **, ***, significant at P≤0.05, 0.01 and 0.001, respectively. ns: Non significant.

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