

## **IN-VITRO COMPETITIVE STUDY OF *ALTERNANTHERA PHILOXEROIDES* WITH RICE (*ORYZA SATIVA*) IN SUPPORT OF MORPHOLOGICAL AND BIOCHEMICAL PARAMETERS**

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**Abstract:** *In-vitro* competitive study was performed between Rice (*Oryza sativa*) and *Alternanthera philoxeroides* to identify the adverse effect of weed on crop. Morphological parameters like death percentage of rice, height of seedling, number of tillers, number of panicles per tiller, and weight of grain were observed up to 71 days after 7 days of intervals. Death of rice came faster in competition than control experiment. All other morphological parameters of rice were increased in control experiment. Weight of grain (100 pcs) was decreased up to 14.33% when rice was competed with weed. For Biochemical parameters, chlorophyll degradation, protein degradation and enzymatic assay of catalase were estimated. More than 50% degradation of protein and chlorophyll was observed in test experiment whereas catalase activity was increased up to fifth fold. Lastly it can be concluded that crop production was inhibited when it was challenged with *Alternanthera philoxeroides*.

**Keywords:** *Alternanthera philoxeroides*, biochemical parameters, competition, morphological parameters, Rice

**Introduction:** Crops and weeds were grown simultaneously from the ancient age when farmers started cultivation. Weeds are undesirable plants grown rapidly in the field and compete with main crops for the growth factors of crops like nutrients, soil moisture, light, space, etc. Most of the weeds including *Phalaris minor*, *Avena ludoviciana*, *Echinochloa crusgalli*, *Elusine indica*, *Cyperus rotundus*, *Cynodon dactylon*, *Sorghum halepense* etc. are great competitor of crops and reduce crop yield. Critical period of crop-weed competition is very much important for production of crops. Maximum loss in grain yield is observed in this period due to competition by weeds. Crop productivity is reduced if weed management is not done properly during this period [1]. Biochemical and antioxidant activity of crops due to competition with weeds were observed by different researchers [2]-[5]. Limited number of study [6] was conducted for morphological changes of crops due to competition. The main aim of the study was to observe the morphological and biochemical changes of Rice (*Oryza sativa*) due to competition with *Alternanthera philoxeroides*.

**Results and Discussions: Morphological Study:**

**a) Death Percentage of Rice:**

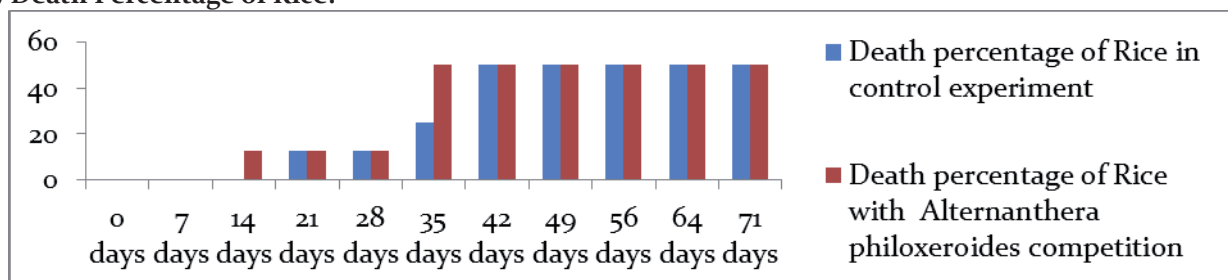


Fig-1: Graphical representation of death percentage of Rice

In control experiment, no death of Rice was observed up to 14 days. But 50% death of Rice was observed after

42 days. During competition, no death of Rice was observed up to 7 days. But 50% death of Rice was observed after 35 days of plantation. Death of Rice came faster in competition than control experiment.

**b) Height of the seedling of Rice (in cm) during competition and control experiment**

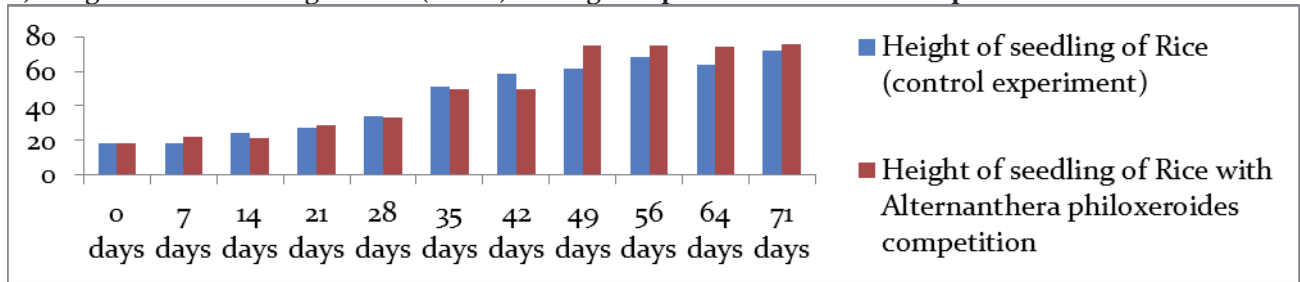


Fig-2: Graphical representation of height of seedling of Rice  
Height of seedling of Rice was increased significantly and gradually in control and test experiment. No such impacts on competition had been observed in this case.

**c) Number of tillers of Rice:**

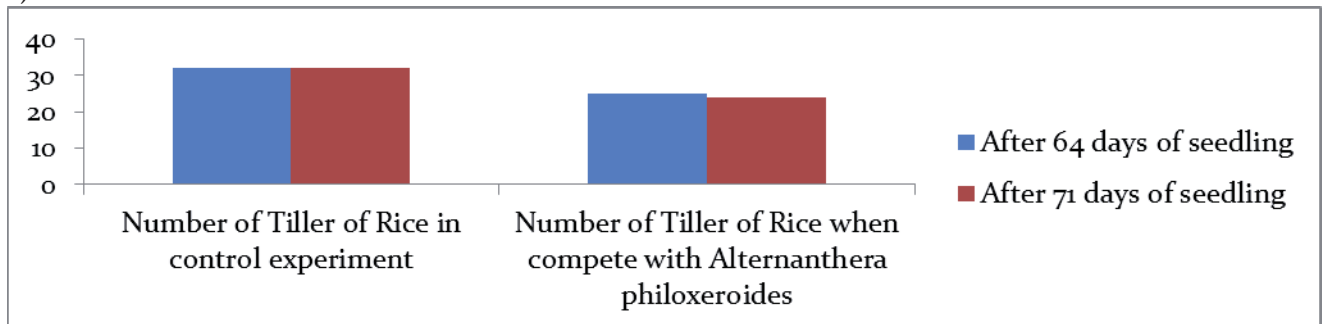


Fig-3: Graphical representation of number of tillers of Rice  
Numbers of tillers of Rice were increased with time. Tillers were matured before grain production. A small decrease in number of tillers was observed in case of *Alternanthera philoxeroides* competition.

**d) Number of panicles in all tillers:**

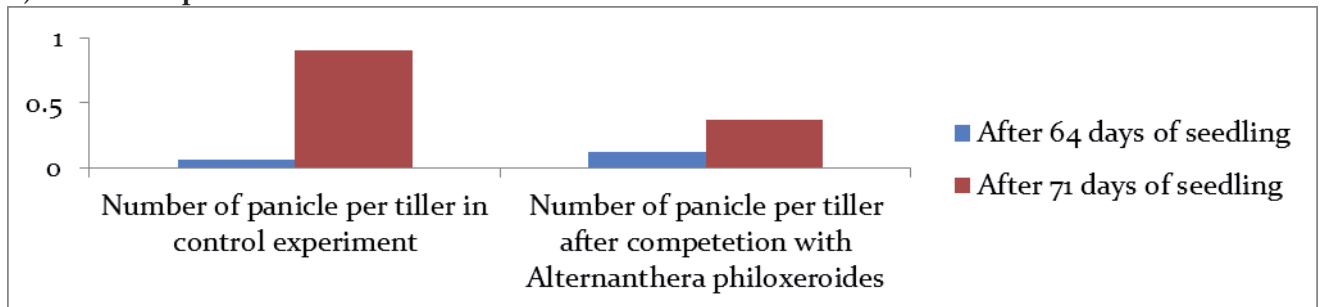


Fig-4: Graphical representation of number of panicles in all tillers  
Panicle number was sharply changed in control experiment between 64 days and 71 days. A small increase in panicle number was observed during competition.

**e) Number of panicles per tiller**

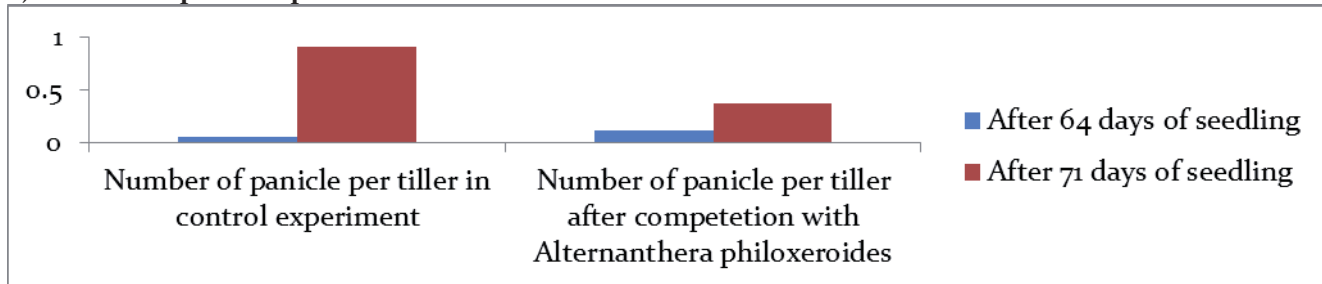


Fig-5: Graphical representation of number of panicles per tiller  
90.60% of panicle per tiller was observed in control experiment; whereas only 37.50% of panicle per tiller was found during competition.

**f) Number of grains per panicle**

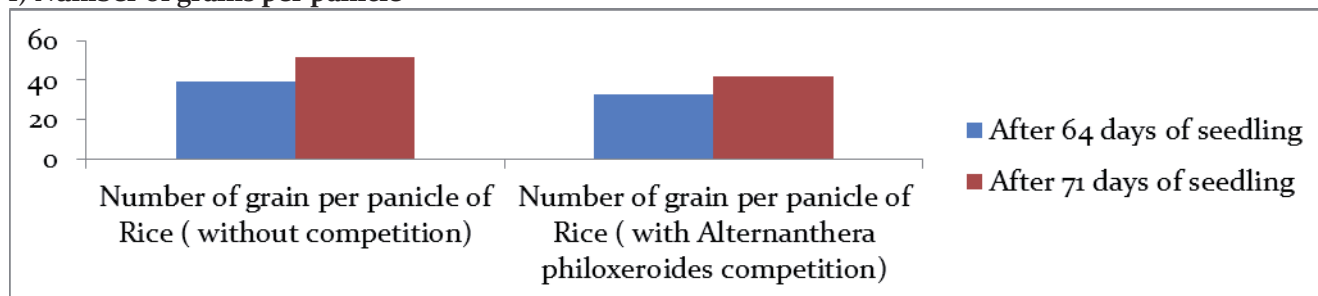


Fig-6: Graphical representation of number of grains per panicle  
Less than 20% grain production was decreased due to competition of *Alternanthera philoxeroides* after 71 days of seedling.

**g) Weight of grain of Rice (100 pcs) after completion of experiment**

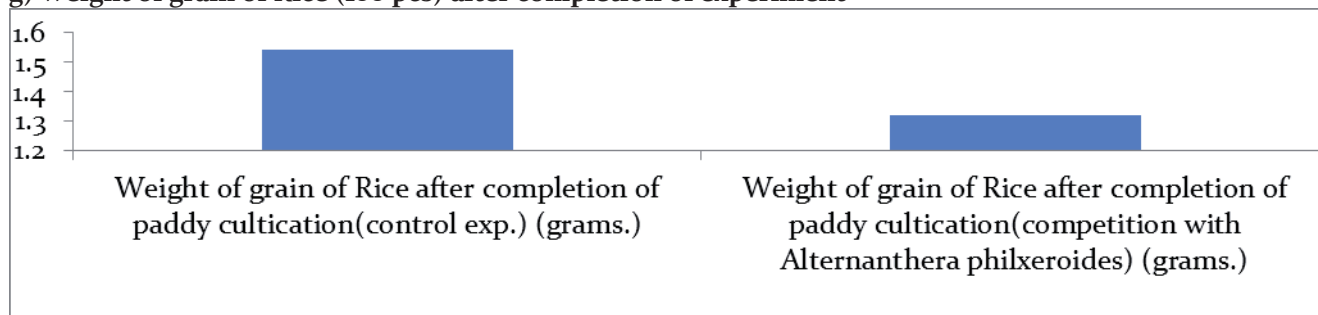


Fig-7: Graphical representation of weight of grain of Rice  
Weight of grain was also decreased when Rice was competed with *Alternanthera philoxeroides* and it was decreased up to 14.33% due to competition.

**h) Percent coverage of competitive field with Alternanthera philoxeroides**

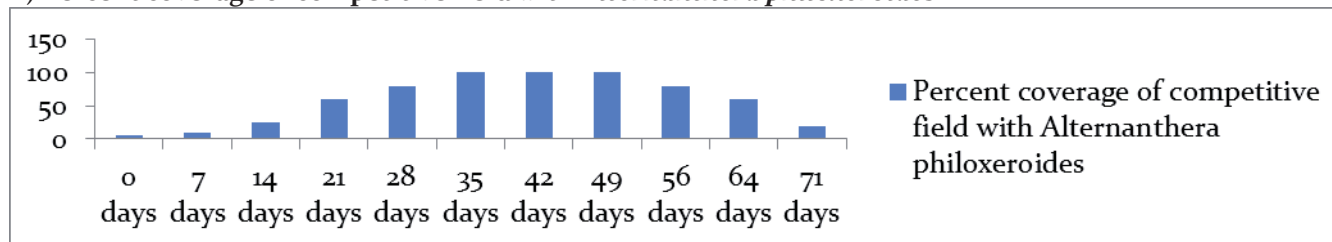


Fig-8: Graphical representation of Percent coverage of competitive field with *Alternanthera philoxeroides*  
Percentage of coverage of weed was increased gradually. Within 35 days, 100% coverage with weed was observed in all trays. After 56 days, coverage was decreased gradually and rapidly.

**i) Comparative study between number of seedling of Rice and number of Alternanthera philoxeroides**

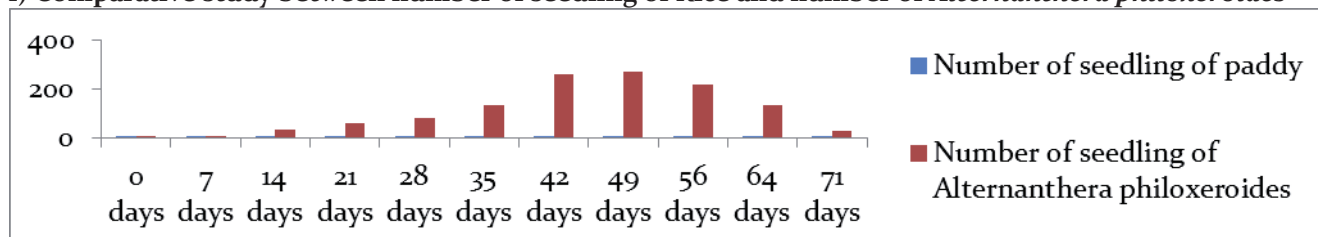


Fig-9: Graphical representation of number of seedling of Rice and number of *Alternanthera philoxeroides*  
The numbers of the seedlings of *Alternanthera philoxeroides* were increased gradually and rapidly with respect to seedling of Rice. After 56 days of competition, numbers of weed was decreased rapidly. Maximum number of

weed was observed between 42 and 56 days. Between these days weed took nutrients from soil (fertilizer was added after 35 days) and growth rate of weed was maxima.

### Biochemical Study:

#### Estimation of Chlorophyll degradation and Proteins reduction and Catalase activity

Table-I: Chlorophyll degradation, Proteins reduction and Catalase activity of Rice

Chlorophyll degradation (%) of Rice in Control Experiment after 56 days	Chlorophyll degradation (%) of Rice due to competition after 56 days	Reduction of protein content (%) of Rice in control experiment after 56 days	Reduction of protein content (%) of Rice due to competition after 56 days	Catalase activity (micromole /min/gm. of protein) of Rice in control experiment after 56 days	Catalase activity (micromole /min/gm. of protein) of Rice due to competition after 56 days
20%	50%	20%	75%	100	480

Biochemical data related to chlorophyll degradation and protein reduction of Rice were reduced significantly up to 50% and 75% respectively due to competition. Only 20% of reduction was observed in control experiment. Catalase activity in Rice was observed more or less 5 times with respect to control experiment when rice was challenged with *Alternanthera philoxeroides*.

**Conclusion:** Crop production was inhibited when it was challenged with *Alternanthera philoxeroides*.

Comparison between growth statuses of Rice with growth status of *Alternanthera philoxeroides* showed that rapid growth of *Alternanthera philoxeroides* was found when fertilizer was added to the soil. So, weed management is very much necessary during this period. Otherwise weeds take nutrients from soil and reduce crop productivity.

**Acknowledgement:** Authors thank Department of Environmental Science, Asutosh College for laboratory support.

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