

WEED'S DISTRIBUTION IN RICE FIELDS OF FIVE DISTRICTS OF THE PUNJAB

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Abstract

Survey of rice (*Oryza sativa* L.) fields of five districts of Punjab Viz. Gujranwala, Sialkot, Gujrat, Kasur and Sheikhupura revealed that *Cynodon dactylon*, *Cyperus rotundus*, *C. difformis*, *Echinochloa colonum*, *E. glabrescense*, and *Paspalum paspaloides* were highly abundant weeds widely distributed through out the surveyed areas. Percentage frequency of occurrence of these weeds in different fields of a district was generally high. However, great variability in abundance among the districts and in frequency among the fields within a district was observed. Among the six abundant and frequently occurring weeds, four species namely *C. rotundus*, *C. difformis*, *E. colonum* and *P. paspaloides* were also characterized with dense population and covered a large area in rice fields. These weeds are, therefore, warranting to be eradicated with out any further delay to get better rice production in the coming years.

Introduction

Rice is the world's most important crop second to wheat feeding over two billion people in Asia alone. On this continent about 90 % of the world's rice is grown (IRRI, 1993) and occupies about 10 % of the total cropped area (Anonymous, 1995). In Pakistan average yield of the rice is about half to that of developed countries (Karim and Riazuddin, 1999). Although in Pakistan the area under rice cultivation has increased by 11 % but the yield per hectare has decreased by about 12 % (Saddique et al. 1995). Muhammad (1980) has reported that major constraints in crop production in Pakistan are weeds. Average crop losses due to weeds in Pakistan are 11.3 % as compared to world losses of 9.5 % (Crammer, 1967). Weeds may interfere with crop growth by competing for light, water and nutrients; by secreting allelochemicals; or by creating a habitat for growth of various pests (Rao, 2000).

Unfortunately paddy land is particularly suitable for the development and spread of both aquatic and semi-aquatic weeds. Saeed *et al.* (1988) studied the distribution of rice weeds in different areas of the Punjab. However, the weed-rice ecological relationships are never static. The continuous adaptation of any particular rice production system causes a shift in dominance and distribution of weeds. Also the prevailing environmental conditions and factors contribute much towards the difference in distribution and frequency of weeds in different area (Rao, 2000). All these phenomena warrants that surveys of the fields be undertaken with a view to determine the present status of weed's distribution in fields of some rice growing areas of the Punjab. For these purpose extensive surveys of five rice-growing districts of the Punjab viz. Gujranwala, Sialkot, Gujrat, Kasur and Sheikhupura were undertaken.

Materials and methods

Surveys of rice fields of five districts of the Punjab viz. Gujranwala, Sialkot, Gujrat, Kasur and Sheikhupura were conducted during July – September 1999 and 2000. Ten fields in each of the five districts, each having an area of one acre, were

selected at random. Distribution of weeds was studied with the help of a 1-m² quadrat. Ten quadrats were randomly thrown in different parts of a field. Data regarding the abundance of a weed in a district, percentage frequency of a weed in a field, density of a weed per unit area of a field and percentage cover of frequent, abundant and densely populated weeds was determined.

Percentage abundance was determined by the following formula.

$$\% \text{abundance} = \frac{\text{No. of fields in a district in which a weed was present}}{\text{Total number of fields surveyed in a district}} \times 100$$

The percentage frequency of occurrence was determined by the following formula.

$$\% \text{ frequency} = \frac{\text{No. of quadrates in a field in which a weed was present}}{\text{Total quadrates in a field}} \times 100$$

Density of a weed was determined as follows:

$$\text{Density} = \text{No. of plants of a weed} / \text{m}^2$$

The percentage cover of the highly abundant, most frequent and densely populated weed species was determined visually.

Results and discussion

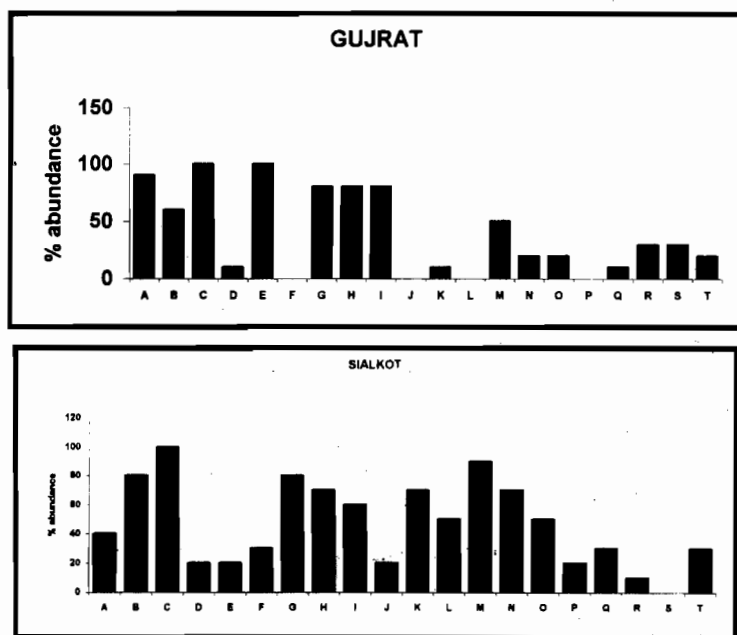
Abundance of weeds: District wise abundance of rice weeds is presented in Fig. 1. Out of 20 weed species collected from rice fields of the five districts, *Cynodon dactylon*, *Echinochloa colonum*, *E. glabrescens*, *Cyperus difformis* and *Paspalum paspaloides* were found to be highly abundant, found in 60% or more fields in almost all the districts. This could be attributed to the high adaptability potential of these weeds that enable them to grow under different environmental and edaphic factors. This feature ensures a degree of success either by allowing the plant to make especially full use of the amounts of the nutrients, water, heat or light available to it or by bestowing a significant amount of protection against some adverse factors, such as extremes of temperature, drought, or parasites (Daubenmire, 1972). *Fimbristylis littoralis* was highly abundant in Gujranwala and Sialkot while *Marsilea minuta* in Sialkot only. There was a great variability in abundance of other, comparatively less abundant weeds, among the districts.

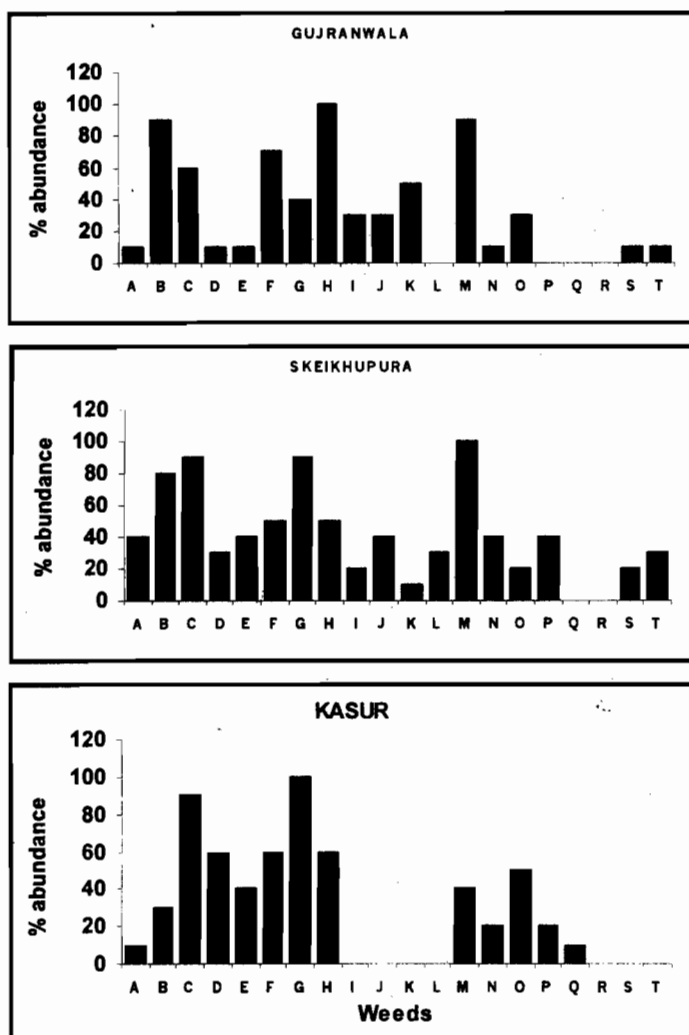
Percentage frequency of occurrence: District wise frequency of occurrence of weeds in rice fields is shown in Fig. 2. There was not any consistency in frequency of any weed in different districts. Even the frequency of a weed varied greatly among the fields within a district. The frequency of some weeds such as *Cyperus difformis*, *C. rotundus*, *F. littoralis*, *E. colonum*, *E. glabrescens* and *P. paspaloides* was 60% or more in one or more districts.

Density of weeds: District wise density of weeds in rice fields is given in Fig. 3. *Alternanthera sessilis*, *C. rotundus*, *C. difformis*, *F. littoralis*, *P. paspaloides*, *Scirpus roylei*, *M. minuta* and *Heleocharis atropurpurea* were found to be densely populated weeds. However, there was a great variability in densities of these weeds among the districts and among the fields within a district. This differential weed distribution pattern in different fields could be the result of different farming practices adopted by different landowners. It has been suggested that weed densities are lower in crop rotational systems than in monocultures (Liebman and Dyck, 1993). Weed diversity has been shown to increase under crop rotation compared to monoculture (Steveson *et al.* 1997). Crop rotation introduces conditions and practices that are unfavourable for a specific weed species, and thus, growth and reproduction of that species are hampered (Karlan *et al.* 1994). These practices include date of crop sowing and harvesting, as well as the application of herbicides with different selectivity. Because cropping sequence dictates other agricultural management practices, variation in weed's populations among cropping systems may be the direct result of crop rotation (Doucet *et al.*, 1999).

Percentage cover: Percentage cover of abundant, frequent and densely populated weeds in five surveyed districts is shown in Fig. 4. The area covered by these weeds varied greatly among the districts.

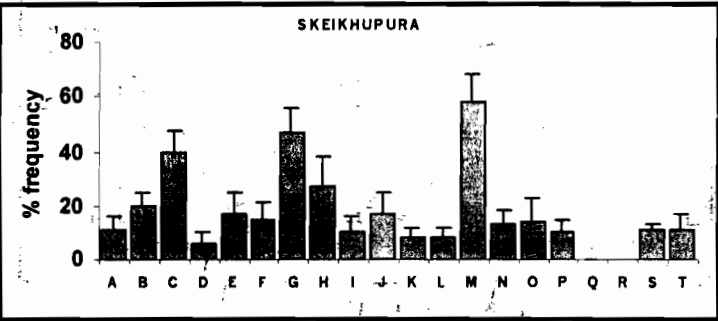
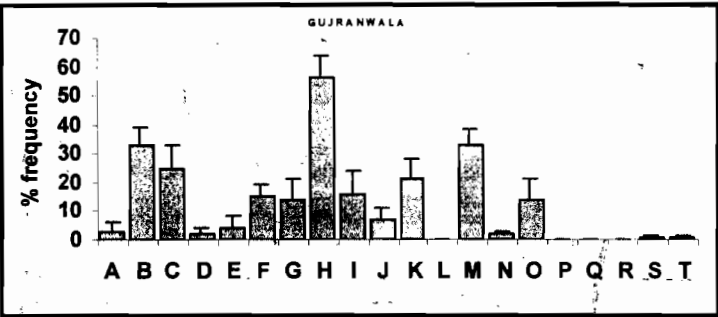
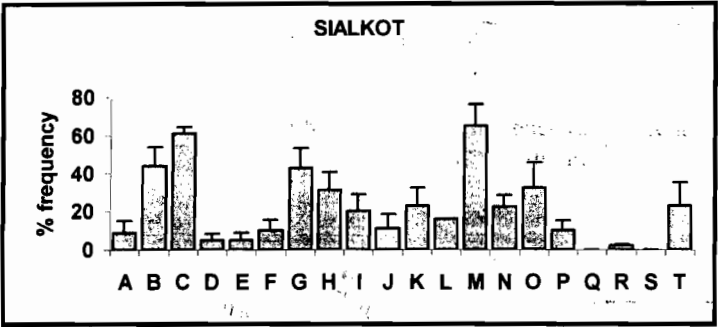
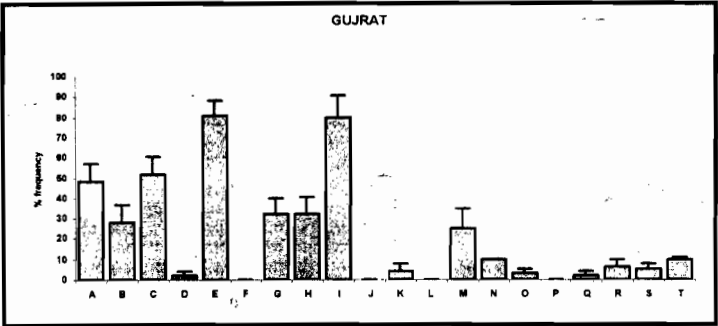
Cyperus difformis, *C. rotundus*, *Echinochloa colonum*, *E. glabrescens*, *Marsilea minuta* and *Paspalum paspaloides*, characterized with high frequency and density, covered a comparatively greater area in rice fields of the five important rice growing districts of the Punjab than other weeds and are warranting to be eradicated with out any further delay.

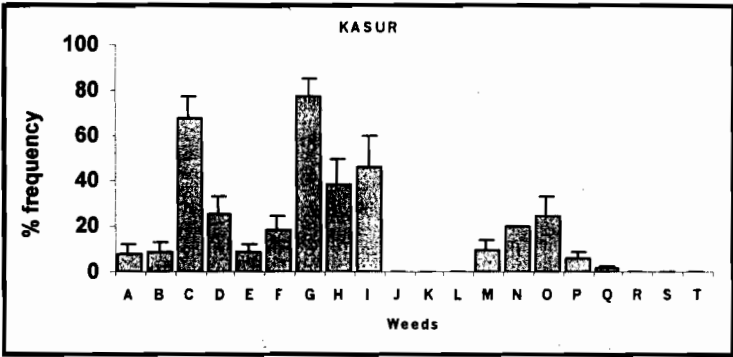




A- *Alternanthera sessilis* B- *Cynodon dactylon* C- *Cyperus difformis*
 D- *C. iria* E- *C. rotundus* F- *Eclipta alba* G- *Echinochloa colonum*
 H- *E. glabrescens* I- *Fimbristylis littoralis* J- *Ipomoea aquatica*
 K- *Marsilea minuta* L- *Monochoria vaginalis* M- *Paspalum paspaloides* N- *Sphenochlea zeylanica*
 O- *Scirpus roylei*
 P- *S. littoralis* Q- *Digitaria ciliaris* R- *Phyllanthus niruri*
 S- *Dactyloctenium aegyptium* T- *Heleocharis atropurpurea*.

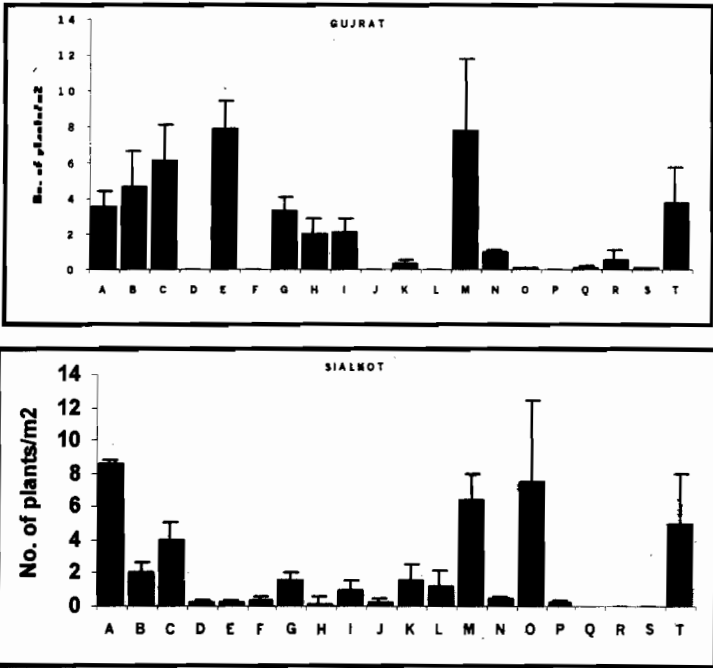
Figure 1: Abundance of different rice weeds in five districts of the Punjab.

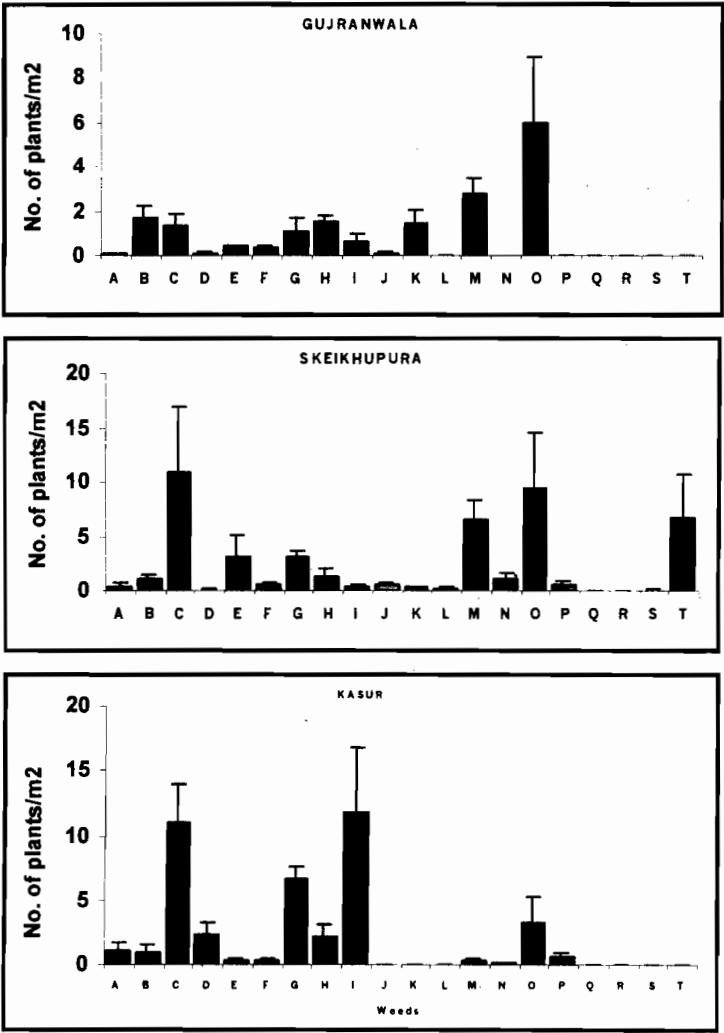




Vertical bars denote the standard errors of the means of 10 fields.
For weeds A - T, see Fig. 1

Figure 2. Percentage frequency of occurrence of different weeds in rice fields of five districts of the Punjab.





Vertical bars denote the standard errors of the means of 10 fields.
For weeds A - T, see Fig. 1.

Figure 3. Density of different weeds in rice fields of five districts of the Punjab.

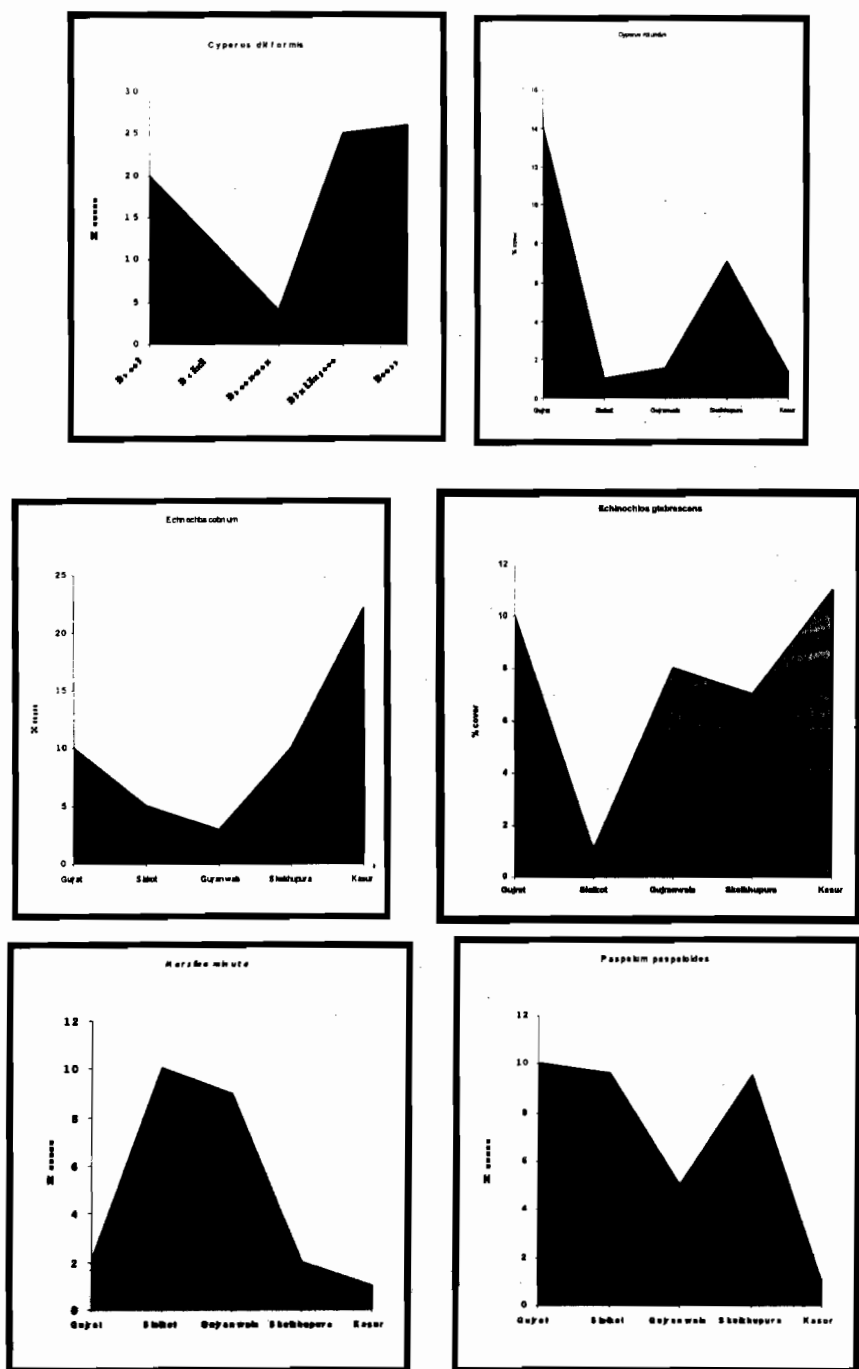


Figure 4. Percentage cover of abundantly and frequently occurring weeds in rice fields of five districts of the Punjab.

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