

WEEDS OF DELHI II- CERTAIN MEMBERS OF GRAMINEAE

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The efficacy of pathogens for the biological control of grasses are reviewed in light of the biology of the host plant. Many grasses were collected i.e. *Arachne*, *Botriochola*, *Chloris*, *Cynodon*, *Digitaria*, *Dactyloctenium*, *Eragrostis*, *Leptochola*, *Oplismenus*, *Phalaris* and *Setaria* and several pathogens were recorded on these grasses namely *Puccinia*, *Ustilago*, *Phyllochora*, *Alternaria*, *Curvularia*, *Drechslera*, *Helminthosporium*, *Piricularia* and *Sorosporium* etc. Some of them can be used as biocontrol agents for these weeds.

Keywords: Grasses, Pathogens, Weeds.

Introduction

Weeds associated with field crops pose a serious threat as it is very difficult to control their spread by ordinary methods. Noxious weeds have been defined as plants which are capable of disrupting ordinary farming operations and resisting measures for control or eradication. Many weeds reproduce and spread vegetatively as well as by seeds. *Digitaria sanguinalis*, *Botriochola* sp, *Brachiaria* sp. and *Oplismenus* sp. are herbs and capable of vegetative reproduction. Besides producing enormous quantity of seeds they also have under ground parts such as rhizomes, stolons, root stocks, bulbs and tubers which make them beyond the reach of routine control measures. Depending on the degree of competition weeds reduce the crop yield by 10 to 85%. Weeds serve as alternate hosts for several pathogens.

The present paper describes some of the commonly occurring graminaceous weeds of Delhi. The purpose of this survey is to note and collect the facultative parasites present on these weeds, which can be further used for the control of weeds. Biological control of pests with their natural enemies can reduce our dependence upon toxic synthetic chemicals. Success or failure of biological control depends on interactions between target species (host), control agents (natural enemies) and the environment.

Material and Methods

Attempts were made to collect all the graminaceous weeds growing in different parts of Delhi during different seasons. The time of their appearance, reproduction and dissemination were regularly observed through out the year (Table 1. Fig.1 A-I). Identification of these weeds were made using standard monographs¹⁻³. The pathogens occurring on these weeds were identified⁴.

Results and Discussion

Eleven genera were collected from different localities of Delhi- *Arachane*, *Botriochola*, *Brachiaria*, *Chloris*, *Cynodon*, *Digitaria*, *Dactyloctenium*, *Eragrostis*, *Leptochola*, *Oplismenus*, *Phalaris* and *Setaria* (Fig.1). These genera can be separated from each other on the basis of their leaf morphology, flowering and seed formation. Some of the genera persist through out the year, while others appear only for a short duration. *Cynodon dactylon* is a perennial grass with long runners which strike roots at the nodes and have extensive under ground rhizomes. The leaves of *Cynodon* vary greatly in length from 3 to 20 cm. Its inflorescence consists of 4 to 5 slender purplish spikes upto 10 cm long. It propagates vegetatively more than by seeds. Several pathogens are known to occur on *Cynodon* sp. (Table 2) i.e. *C.dactylon* and *C.plectostachyum*, *Puccinia cynodontis*,

Ustilago cynodontis and *Phyllochora cynodontis*^{5,6} were recorded from Delhi during the months of March and April. *Alternaria vitis*, *Cercospora cynodontis*, *Curvularia lunata*, *Drechslera cynodontis*, *Helminthosporium microsporum* and *Septoria cynodontis* are reported from other parts of India⁷⁻¹³.

About 20 species of *Digitaria* are reported from India. *D. adscendens* is an annual grass with smooth and stout culm, usually decumbent at the base. It exhibits perennial growth. It flowers between July and September. Several pathogens are reported on this plant, namely *Claviceps digitariae*, *Physoderma digitariae*, *Piricularia grisea*, *Puccinia digitariae* and *Ustilago longiflora*¹⁴⁻²⁰.

Paspalum conjugatum is a creeping stoloniferous perennial grass. The culms are 20 to 40 cm long, erect with smooth nodes. The spikes are two, rarely three at the apex of culm, widely spreading, straight or somewhat arched. The spikelets are flattened, pale green. The margins are fringed with bug white silky hairs. *Puccinia paspali* and *Sorosporium paspali* are found in Delhi^{21,22}. *Drechslera* sp., *Ephelis oryzae* and *Uredo paspali* are reported from other parts of India²³⁻²⁵.

Phalaris minor is one of the most trouble some weed. Morphologically, it is similar to wheat plant. It flowers after October till December but seeds persist till March. *Drechslera avenae* is reported on this plant from Delhi^{26,27}.

Oplismenus is annual herb, hairy, stem leafy, slender, weak and ascending often rooting at the lower points. Leaves are flat, lanceolate, tapering to a fine point. Spikelets are narrowly ovoid, nearly sessile, jointed at the base, solitary in pairs or small

clustures arranged in a single spike. *Cercospora oplismeni*, *Puccinia oplismeni*, *Tilletia vittata*, *Ustilaginoidea oplismeni* are reported on this plant²⁸⁻³¹.

Setaria is a annual, with erect stem, leaves flat, lanceolate, long pointed, ligules with a fringe of hairs. Spikelets numerous glabrous usually, flowers cylindric, tapering panicles. Bristles unequal from two to four times as long as the spikelets, pale brown or tinged with purple. *Setaria tomentosa* is a loosely tufted annual. *Setaria glauca* is a tufted annual grass upto 150 cm high. Culms simple or branched erect or ascending. *Sclerospora graminicola* occurs very frequently on this plant³².

Most of the grasses persist through out the year vegetatively. On the basis of their leaves they can not be identified. They can be recognized only on the basis of their flowers. Most of them flower in the month of July and their seed dispersal takes place in the month of September. Some grasses have a ear just like wheat plants as in *Phalaris* while in others they have a stiff and prickly hairs e.g. *Setaria glauca*.

Eragrostis ciliaris spikelets are awnless, minute or rarely 1/2 inch. Culms geniculately ascending glabrous. Leaves very narrow. Panicles compact, short, cylindric spike like, hairy due to presence of long cilia on Palea, branches divided from base. *Drechslera ravenelii*, *Helminthosporium bhawanii*, *Sclerospora butleri*, *Tilletia transvalensis* are reported on this grass^{20,30,33,34}. *Chloris dolichostachya* a perennial grass with erect or proceunbentstems upto 1 m tall after branched, leaves linear, infloresence of generally 5 digitate, spreading spikes forming a terminal whorl. Pathogens present on this grass are *Entyloma chloridis*, *Puccinia*

Table 1. Occurrence of weeds during the different months of year (Gramineae)

Weeds	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.
<i>Arachane</i>	-	-	-	-	-	+V	+V	+F	+S	+S	+S,D	-
<i>Botriochola pertusa</i>	-	-	-	-	-	+V	+V	+V	+F	+S	+S,D	-
<i>Chloris dolichostachya</i>	-	-	-	-	-	+V	+V	+V	+F	+S	+S,D	-
<i>Cynodon dactylon</i>	-	-	-	-	-	+V	+V	+V	+F	+F	+S	-
<i>Digitaria adscendens</i>	+V	+V	+V	+V	+V	+V	+V	+V	+F	+S	+S	+V
<i>Dactyloctenium aegyptium</i>	-	-	-	-	-	+V	+V	+V	+F	+F,S	+S	-
<i>Eragrostis ciliaris</i>	-	-	-	-	-	+V	+V	+V	+F	+S	+D,S	-
<i>Leptochola panicea</i>	-	-	-	-	-	+V	+V	+V	+F	+S	+S,D	-
<i>Oplismenus compositus</i>	-	-	-	-	-	+V	+V	+V	+V	+F	+F	-
<i>Phalaris minor</i>	+F	+F	+F	+S	-	+V	+V	+V	+F	+F	+F	+F
<i>Setaria glaucata</i>	-	-	-	-	-	+V	+V	+V	+F	+S	+S	-
<i>S.tomentosa</i>	-	-	-	-	-	+V	+V	+V	+F	+S	+F	-

V-Vegetative; F-Flowering; S-Seed formation; D-Dispersal

Table 2: Occurrence of various pathogens on these weeds.

Weeds	Pathogens
<i>Paspalum conjugatum</i>	- <i>Puccinia paspali</i> , <i>Sorosporium paspali</i> , <i>Drechslera</i> , <i>Uredo paspali</i>
<i>Chloris dolichostachya</i>	- <i>Entyloma chloridis</i> , <i>Puccinia chloridis</i> , <i>Sphacelotheca chloridis</i> , <i>Ustilago valentula</i> .
<i>Cynodon dactylon</i>	- <i>Puccinia cynodontis</i> , <i>Ustilago cynodontis</i> , <i>Alternaria</i> , <i>Cercospora</i> , <i>Curvularia</i> , <i>Drechslera</i> , <i>Hemlinthosporium</i> , <i>Septoria cynodontis</i>
<i>Digitaria adscendens</i>	- <i>Claviceps digitariae</i> , <i>Physoderma</i> , <i>Piricularia grisea</i> , <i>Puccinia digitariae</i> , <i>Ustilago longifallia</i>
<i>Eragrostis ciliaris</i>	- <i>Drechslera ravenelii</i> , <i>Helminthosporium bhawanii</i> , <i>Sclerospora butleri</i>
<i>Oplismenus compositus</i>	- <i>Cercospora oplismeni</i> , <i>Puccinia oplismeni</i> , <i>Tilletia vittae</i> , <i>Ustilaginoidae oplismeni</i>
<i>Phalaris minor</i>	- <i>Drechslera avenae</i>
<i>Setaria glauca</i>	- <i>Sclerospora graminicola</i>

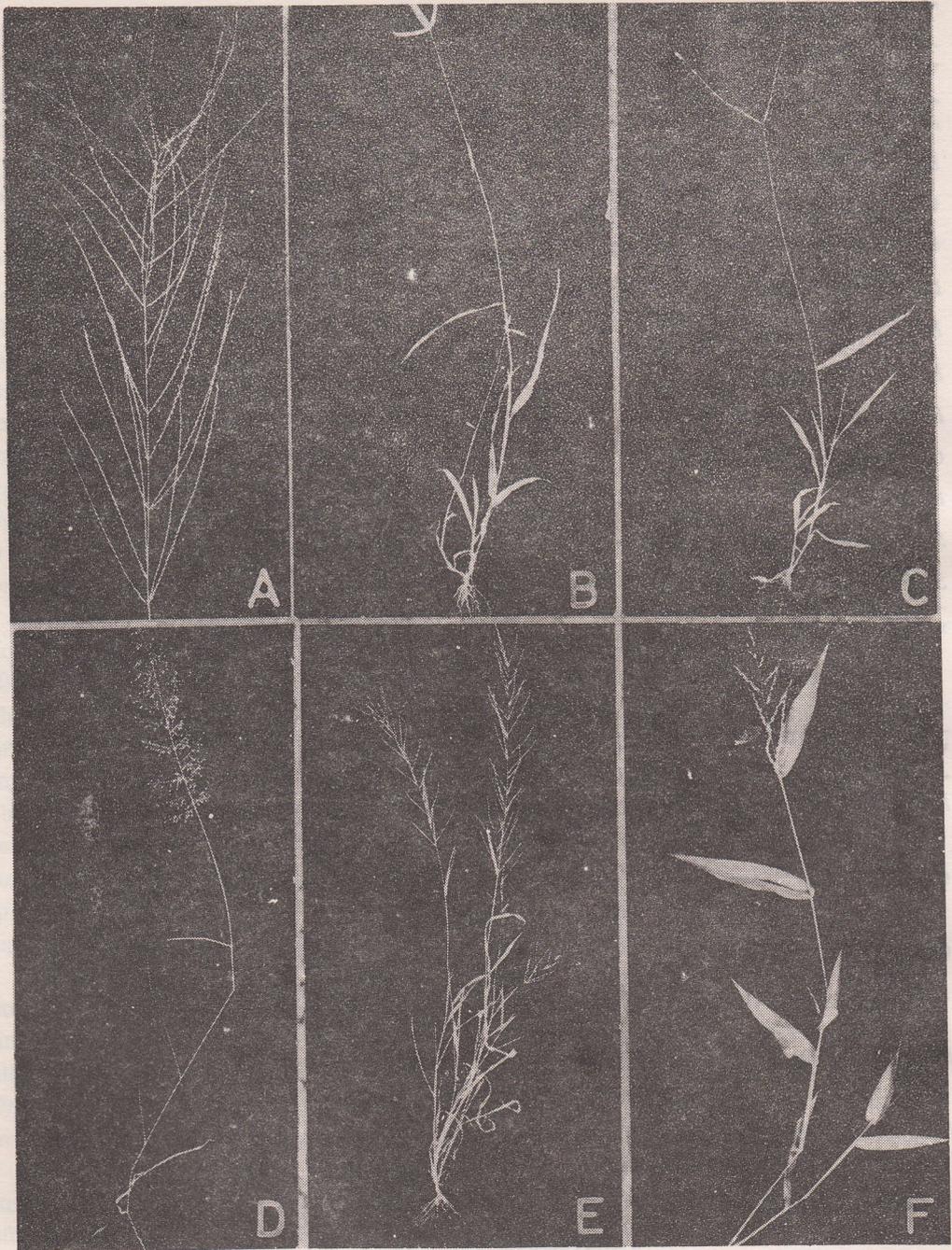


Fig. 1. Showing external appearance of A. *Arachne racemosa*. B. *Dactyloctenium aegypticum*. C. *Hemarthria compressa*. D. *Eragrostis ciliaris*, E. *Lectochola panicea*, F. *Oplismenus compositus*.

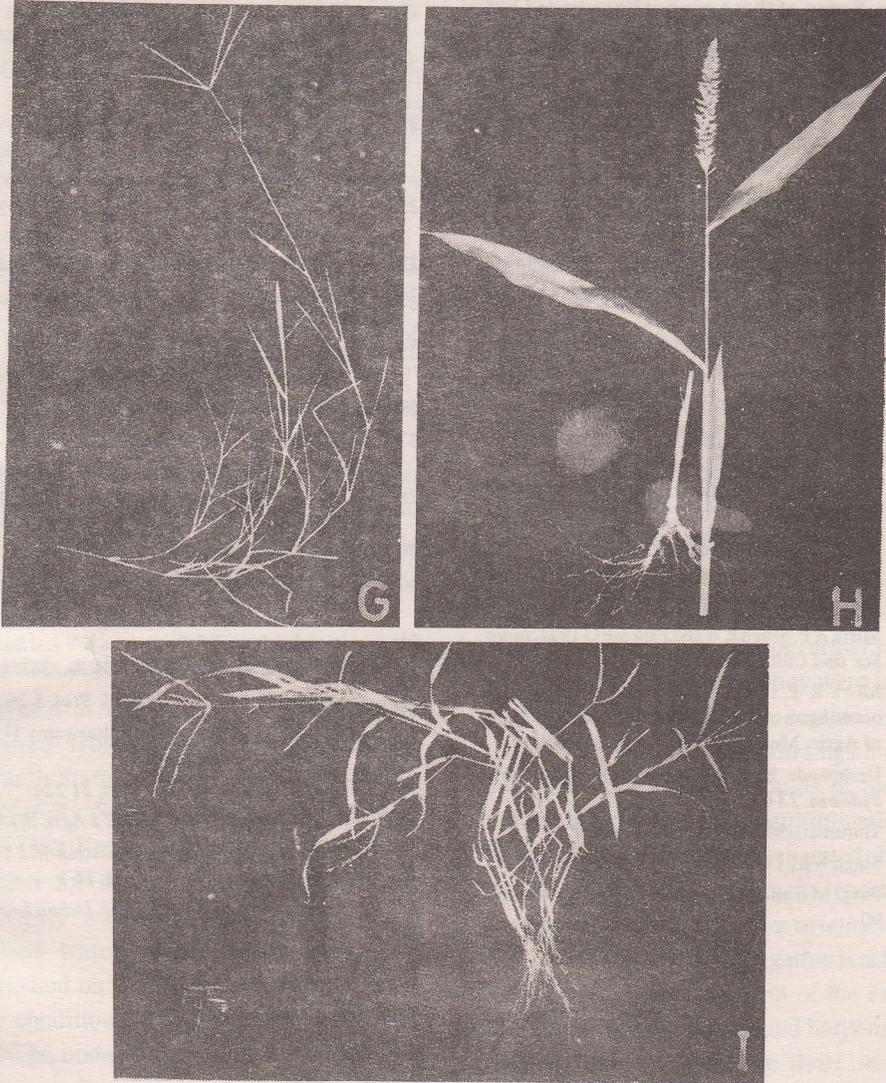


Fig. 1. G. *Cynodon dactylon*, H. *Setaria glauca*, I. *Elusine indica*.

chloridis, *Sphacelotheca chloridis*, *Ustilago valentula*³⁵⁻³⁷.

It is quite evident from the above that several pathogens are present on various grasses. Some of these cannot be cultured but Deuteromycetes can be cultured and can be further used as mycoherbicide.

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