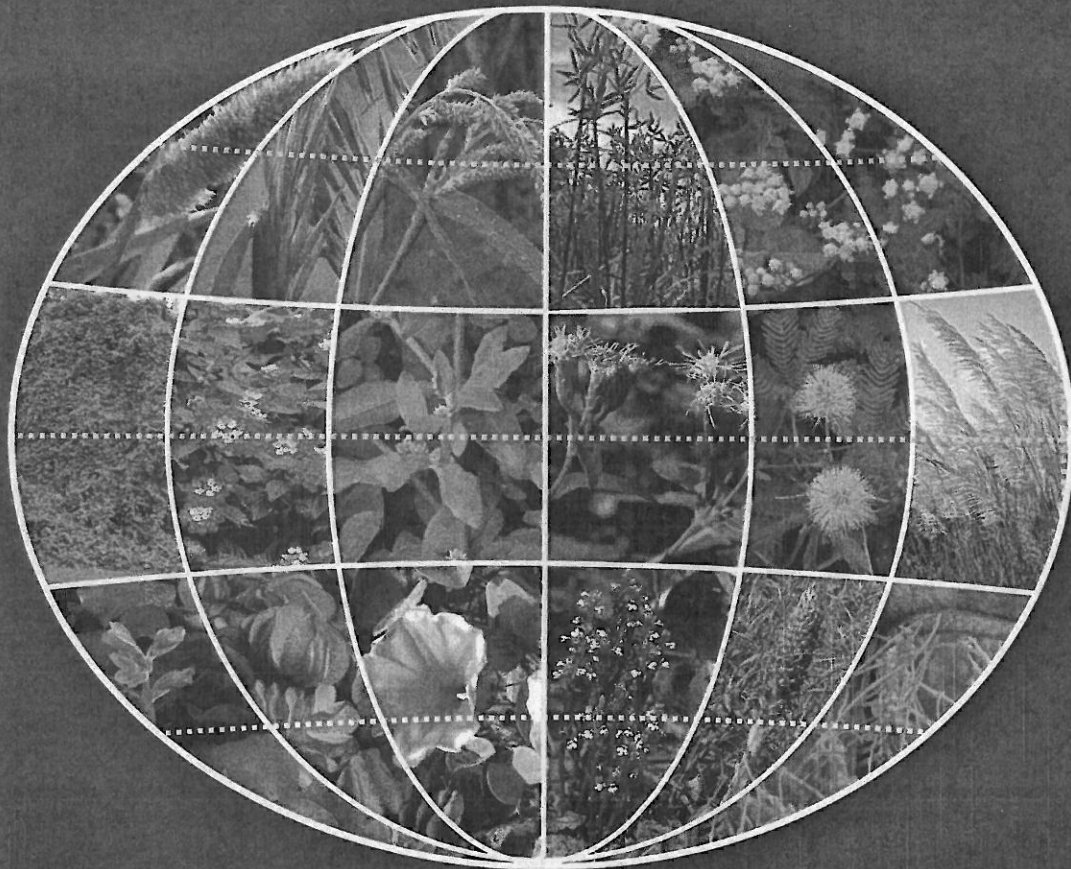


# Weed Science in the Asian-Pacific Region

Editors

V.S. Rao • N.T. Yaduraju • N.R. Chandrasena • Gul Hassan • A.R. Sharma



In commemoration of  
Silver Jubilee APWSS Conference, Hyderabad, India



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**Cover page:** Logo of the APWSS indicating the globe has been superimposed with the major weed species of the world, which include (in sequence): *Phalaris*, *Avena*, *Echinochloa*, *Cyperus*, *Ageratum*, (cropland weeds); *Parthenium*, *Mikania*, *Alternanthera*, *Chromolaena*, *Mimosa*, *Saccharum* (non-cropland weeds); *Eichhornia*, *Salvinia*, *Ipomoea* (aquatic weeds); and *Striga*, *Orobancha*, *Cuscuta* (parasitic weeds). (Designed by: Mr. V.K.S. Meshram and Mr. Sandeep Dhagat, DWR, Jabalpur, India)

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## Weed Research and Weed Science in Bangladesh

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**Abstract:** Bangladesh is a tropical country with hot and rainy summers, and dry and comparatively cooler winters. The climatic conditions favour exuberant growth of diversified weed flora. About 350 species belonging to different plant families have been identified as weeds in cultivated fields. The three main parasitic weeds found infesting crops include *Striga densiflora*, *Orobancha* spp. and *Cuscuta reflexa*. On an average, 37.3% of crop produce is lost due to unrestricted growth of weeds in crop fields. In farmers' fields, 13.1% of crop production is lost even after adopting traditional weed control practices. Over 2.5 million tons of food grains, valued at US\$ 246.2 million, are lost annually due to weeds. The traditional manual weeding is mainly employed in farmers' fields but herbicides are used in tea plantations and government farms. The recent introduction of *Parthenium hysterophorus* is a threat for human and animal health, production of upland crops, biodiversity and soil ecosystem of the country. Proper research on weeds and weed control began in the early 1960s. Currently, weed research is being done in all agricultural research institutes and universities. Power rotary weeder and power tiller-operated boom sprayer have been developed for weed control. Education on weed science is inadequate. The Weed Science Society of Bangladesh organizes conferences biennially and publishes a weed science journal annually.

**Key words:** Boom sprayer, crop loss, education, major weeds, parasitic weeds, *Parthenium* infestation, power weeder, weed science education, weed science society.

### Introduction

Bangladesh is an agriculture-based country with tropical climate characterized by hot and rainy summer, and a dry winter. December and January are the coldest months, with temperatures ranging between 14 C and 26 C. Temperatures during April-June, the warmest months, vary between 25 C and 36 C. Most places receive more than 1,525 mm of rain in a year. More than 80% of the rain occurs in summer (March- August) and the rest in winter (September-February). The humidity varies from the lowest of 73% in winter to the highest of 90% during monsoon (June-September). It is a low-lying country stretching in latitude between 20° 34' and 26° 38' N and between longitude 88° 01' and 92° 41' E [BBS 2011]. The country mostly comprises of floodplain areas with scattered hills at the eastern and northern parts. These conditions encourage the growth of different weeds in the country.

A total of 21 general soil types including floodplains, calcareous alluvium, black terai soils, acid basin clays, acid sulphate soils, peat soils, grey piedmont soils, etc. are recognized in Bangladesh. In most places, clay-loam and sandy-loam soils predominate. Rice, wheat, maize, potato, pulses and oilseeds are the major crops. Rice is the primary staple food and the most important crop. Jute and sugarcane are important cash crops. Tea is an important plantation crop

in hilly areas. Agriculture is characterized by traditional farming using draft animals for land preparation although power tiller (pedestrian tractor) is being used increasingly in both dry and wet lands. About 18% of the total GDP is derived from agriculture [Trading Economics 2015].

### **Weed Research**

The exact time when weed research started in Bangladesh remains obscure. However, a review suggested that research on weeds and weed management began in the early 1960s in the East Pakistan Agricultural Research Station, Tejgaon [Alim et al. 1962]. Chemical weed control was practiced regularly in the mid-1960s at the Tea Research Institute, Srimangal, Sylhet and tea plantations for controlling mainly the perennial weeds. In 1960, M. Ishaque worked on the control of *Celosia argentea* L. (cock's comb) in upland rice and maize by using 2,4-D. Active weed research programme began after the establishment of Bangladesh Rice Research Institute (BRRI), Bangladesh Agricultural Research Institute (BARI), Bangladesh Jute Research Institute (BJRI), Bangladesh Sugarcane Research Institute (BSRI) and Bangladesh Tea Research Institute (BTRI). Besides, several students worked on weed research since 1963 for master's and doctoral degrees in different universities including East Pakistan Agricultural University (now Bangladesh Agricultural University), Dhaka University, Rajshahi University, Chittagong University, Jahangir Nagar University, etc.

### **Major Weeds of Different Crops**

In Bangladesh, about 350 species have been recorded as weeds of cultivated fields. Most of them belonged to Poaceae, Cyperaceae, Leguminosae, Asteraceae, Solanaceae, Acanthaceae, Euphorbiaceae, Amaranthaceae and Scrophulariaceae families. In aquatic conditions, the members of the genera *Eichhornia*, *Potamogeton*, *Pistia* and *Monochoria* are the most common weeds in deep water paddy and fish ponds. Flowering and fruiting of most of the species occur during February to April. Many of the weed seeds germinate during May-October, peaking in June and July [Banglapedia 2015].

About 20% of the present weed flora have been recognized as naturalized exotic weeds. The notable species include *Argemone mexicana* L., *Alternanthera philoxeroides* (Mart.) Griseb., *Croton bonaplandianum* Baill, *Nicotiana plumbaginifolia* Viv., *Lathyrus aphaca* L., *Celosia argentea* L. and *Vicia angustifolia* L. Uddin and Hasan [2003] identified 113 species including timber yielding plants, flowering and fruit-bearing plants, vegetables, avenue trees and weeds as invasive species in Bangladesh. These were introduced into the country deliberately, accidentally or through vectors. Important parasitic weeds causing damages to crops and trees are *Striga densiflora* (Benth.) Benth., *Orobanche* spp., and *Cuscuta reflexa* Roxb. A vast area of sugarcane belt was badly affected by *Striga densiflora* during 1990-2000 and it caused shortage of millable cane to sugar mills. A list of predominant weeds and the extent of severity in a particular crop is presented in Table 1.

### Allelopathic Rice

Allelopathic potential of 102 Bangladeshi rice varieties against four weed species was evaluated. These included cress (*Lepium sativum* L.), lettuce (*Lactuca sativa* L.), barnyard grass [*Echinichloa crus-galli* (L.) P. Beauv} and Jungle rice [*Echinochloa colonum* (L.) Link}. The rice cultivar BR17 was found to be an allelopathic variety, causing 59% growth inhibition of the test weed species. The allelochemical isolated from it was identified as 9-hydroxy-4-megastigmen-3-one. This chemical inhibited root and shoot growth of these weed species at concentrations greater than 0.03  $\mu$ M and 3  $\mu$ M, respectively [Kato-Noguchi et al. 2009, 2010; Salam and Kato-Noguchi 2010].

### Crop Losses Due to Weeds

Yield and quality of crops are lost to a great extent in Bangladesh. On an average, 37.3% of crop produce is lost if weeds are not controlled in the crop fields [Karim et al. 1998]. Crops valued at US\$ 852.36 are estimated to have been lost annually due to unrestricted growth of weeds. Pests of all types may cause a loss of 9.66 million tons of food grains valued at US\$ 1,383 million annually if they are not controlled in crop fields. Production losses due to weeds have been estimated to be 32.2% in food crops, 41.3% in cereals, 31.9% in pulses, 40.8% in oilseeds, 34.2% in fibre crops and 40.3% in rice [Karim et al. 1998]. However, an average of 13.1% of crop produce is actually lost in farmers' fields even after adopting traditional weed control in Bangladesh [Mamun 1990].

Admixture of weed seeds is very common in crop production due to ineffective cleaning system, especially in the rural areas. The seeds of *E. crus-galli*, *E. colonum*, *Parapholis incurva* (L.) C.E. Hubbard and *Cynodon dactylon* (L.) Pers. lower the quality and taste of cooked rice [Islam et al. 2003]. Seeds of *Chenopodium album* L., *Physalis heterophylla* Nees., *Dactyloctenium aegyptium* (L.) P. Beauv. and *Amaranthus viridis* L. commonly get mixed with wheat and when ground with wheat grain. This admixture gives bitter taste to 'chapati' (un-leavened flat bread; also called 'roti'). When seeds of *Vicia sativa* L. and *Vicia hirsuta* (L.) S.F. Gray. are cooked along with lentil and other pulses, the soup ('dal') becomes unpalatable. The seeds of *Bonnaya brachiate* Link & Ott., *Leucas aspera* Spreng. and *C. album* also get mixed with mustard seeds [Mamun 1990].

### Parthenium

Recent introduction of *Parthenium hysterophorus* L. is a big problem infesting almost two-thirds of the country [Karim 2013; Illias et al. 2015]. Its infestation in Bangladesh has been detected first by Rezaul Karim, Department of Agronomy, Bangladesh Agricultural University along the roadside of Jessore-Khulna highway in 2008 [IPaWN 2010]. This weed has been recorded in 19 crop fields including sugarcane, potato, tomato, chili, banana, onion, garlic, lentil, pea etc. Although the intensity of its infestation in the crop fields is not severe, it occupies most of the roadside areas.