Vanishing populations of *Oryza minuta* Presl. in Pangil, Laguna, Philippines

M.C.N. Banaticla and M.S.R. Almazan, IRRI

Oryza minuta Presl., a wild rice species known to be resistant to bacterial blight and blast and green and brown planthopper, is endemic to the Malesian floristic region, specifically in Thailand, the Philippines, Indonesia, and Papua New Guinea. While it has been widely used in breeding and other experimental studies, its ecology and population dynamics remain poorly understood.

In 1980, Vaughan documented six populations of *O. minuta* located along a stream in Barrio Balian, Pangil, Laguna. Seed samples from these populations were collected and later conserved at IRRI's International Rice Genebank.

On 18 Feb 2004, we surveyed the same site and found that all the populations reported by Vaughan (1980) no longer existed. The small irrigation stream where the three populations once stood has been converted into a cemented canal (Fig. 1). During the visit, a road was being constructed near the former location of the other three populations.

We encountered five clumps of *O. minuta* in different locations along the main stream, but unlike the vastly spreading populations described by Vaughan (1980), they appear in small clusters of 2–3 plants (Fig. 2). Two clusters were partly strangled by *Mikania cordata*, a weedy herbaceous vine.

The exclusive occurrence of *O. minuta* along the stream indicates its dependence on water flow for seed dispersal. It is possible that a "mother plant or population" located farther upstream serves as the seed source. It would be interesting to track this presumed mother population and learn more about its biology.

In a period of 24 years, the populations of *O. minuta* in Barrio Balian, Pangil, Laguna, have greatly dwindled, leaving only traces of individual plants. Livestock raising, farming, and road construction destroy the natural vegetation within the vicinity. Such human activities probably played a major role in the

Fig. 1. Cemented canal where *O. minuta* populations once thrived.

Fig. 2. A cluster of *O. minuta* found in the study area.

alarming disappearance of *O. minuta* populations in the area. Further studies on the conservation and population dynamics of *O. minuta* in Pangil, Laguna, are needed to prevent the local extinction of this species.

Reference

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Current status of rice pests and their management in Assam, India—a discussion with extension agents

Z. Islam, K.L. Heong, and M. Bell, IRRI; and L.K. Hazarika, D.J. Rajkhowa, S. Ali, B.C. Dutta, and M. Bhuyan, Assam Agricultural University, Jorhat 785013, India

Rice is the most important crop in Assam, India, grown on about 70% of the total cultivated land (3.64 million ha) in the state (MA 2003). In fact, about 70% of the rice area of the seven northeast Indian states is under Assam. Rice is mostly grown in the low-lying deltas of the Brahmaputra and Barak rivers; some rice is also cultivated in upland situations in the northern hill region. The *sali* (monsoon crop: transplanted lowland rainfed rice and deepwater rice) rice is dominant, occupying 68.8% of the total rice area of 2.54 million ha, followed by *ahu* (summer rice) (18.3%), and *boro* (dry-season/winter) rice (12.9%). To understand Assam's current pest problems in rice, and their management, we arranged four 2 h discussion sessions on each of the major groups of pests (insects, weeds, diseases, and rodents) during an integrated pest management training course implemented at Assam Agricultural University (AAU) in Jorhat on 5-15 Jul 2004. The discussion sessions were led by AAU experts and 19 trainees involved in rice pest management education, research, and extension participated. The gists of these sessions are presented.

Insect pests

Although many insects feed on rice plants, only a few occasionally reach pest status in Assam. The potential insect pests include rice hispa [*Dicladispa armigera* (Olivier)], yellow stem borer [*Scirpophaga incertulas* (Walker)], rice bug (*Leptocorisa* spp.), brown planthopper [*Nilaparvata lugens* (Stål)], leaffolders [*Cnaphalocrosis medinalis* (Guenée) and *Marasmia* spp.], caseworm [*Nymphula depunctalis* (Guenée)], and thrips [*Stenchaetothrips biformis* (Bagnall)]. So far, reliable yield loss estimates are not available and their exact pest status remains uncertain. The important potential pest is rice hispa, which is endemic in Sibsagar, Lakhimpur, Nalbari, Borpeta, Cachar, and Karimganj districts. It is more abundant during sali and ahu seasons than in boro. In outbreak situations, high yield losses may occur in specific fields. Several species of stem borers are present and yellow stem borer is considered predominant; however, conflicting opinions arose with respect to the relative importance of the other species. The incidence of brown planthopper, thrips, leaffolders, and caseworm seems to be increasing, while that of ear-cutting caterpillars [*Mythimna separata* (Walker)] and swarming caterpillars [*Spodoptera mauritia* (Walker)] has decreased significantly compared with their incidence in the pre-green revolution period. The incidence of brown planthopper is relatively greater in the boro, particularly in the Barak River Valley. The rice bug is a major problem in the ahu season, particularly in the early ahu crop. Caseworm is a localized pest and occurs more in the sali season. Root and panicle aphids, white grubs, and rice bugs are major insect pests of upland rice, including the *jhum* (slash-and-burn) system.

So far, insecticide use is minimum and there is some use of botanicals (extracts of plants). However, the extent of insecticide and botanical use and whether farmers are deriving any benefit from their use are yet to be determined. The AAU identified an effective muscardine fungus against rice hispa, whose effect is comparable with that of insecticide. It affects eggs, larvae, and adults but is more efficient in killing eggs. A mass culture method has been developed, but production and marketing have yet to be taken up by either the private or public sector.

Diseases

Assam is very rich in rice genetic diversity. Many traditional cultivars possess genes

of resistance to most rice diseases. Many diseases infest rice plants in Assam, but the most important ones are sheath blight, bacterial blight, and blast in the sali; blast and sheath rot in the ahu; sheath rot and sheath blight in the boro; and ufra and root-knot in deepwater rice. The extent of average yield losses attributed to diseases is not known. However, it is assumed that 15–20% yield losses may occur in some infested fields, although average losses would be much less. Farmers seem to be not very much aware about diseases, unlike what they know of other pests. Although several cultural and chemical options are available for the management of each of the major diseases, it is not known what percentage of the farmers use these technologies, if at all. Some fungicides are available at the grassroots level, but their use is very low. However, most of the popular modern rice varieties possess resistance to or tolerance for blast, and some degree of tolerance for sheath blight and bacterial blight (Table 1).

Table 1. Resistance status of 12 most popular rice varieties of Assam, India.

Variety according to rank	Season	Reaction to major diseases					
		Blast	Sheath blight	Sheath rot	Bacterial blight	Stem rot	Remark
Ranjit	Sali	T	T	MR	MS	MS	Neck blast (R)
Mahsuri	Sali	S	S	T	T	T	
Bahadur	Sali	MR	T	MR	T	MS	
Luit	Ahu	MR	MS				
Disang	Ahu	T	MS		T		Neck blast (T)
Joymati	Boro	MR	T		T		
Aghoni	Sali	T	T	MR	T	MS	
Keteki	Sali	T	T	MR	T	MS	
Manoharsali	Sali	MR	T	MS	T		
Andrewsali	Sali	MR	T				
Joytiprasad	Boro	MR	T		T		
Bishnuprasad	Boro	MR	T		T		

R = resistant, MR = moderately resistant, MS = moderately susceptible, T = tolerant.

Weeds

The agroclimatic conditions of Assam favor the rapid growth of weeds. The type of rice culture, season, soil, and cropping pattern influence the weed flora in rice fields. The most important weed flora in the different rice cultures are listed in Table 2. Among rice cultures, the weed problem is most severe in dry-seeded rice (upland rice), followed by wet-seeded (sprouted seeds) and transplanted rice. Transplanted rice has fewer weed problems because puddling, followed by transplanting of rice seedlings, gives rice plants a head start and enables farmers to use water for weed suppression. The weed flora in rice are dominated by grasses, followed by broadleaves and sedges (Barua and Gogoi 2002). However, alternate wetting and drying conditions that prevail in any culture may result in severe weed problems. The diverse weed flora in deepwater rice emerge in three flushes—before, during, and after the floods. Weeds may reduce rice yields by 15–40%, if not controlled at all. In general, farmers are aware of harmful effects of weeds and they make serious efforts to control weeds using direct and indirect methods. The direct methods practiced by Assamese farmers include manual weeding by using simple tools, the use of simple rotary weeders, and herbicides. So far, manual weeding is the most common, whereas the use of herbicides is very limited. Indirect methods involve tillage, the use of water, transplanting of rice seedlings, etc.

Rodents

To date, 34 species of rats and mice under 12 genera were recorded in northeast India, including Assam (Singh et al 1994). The dominant species are *Bandicota bengalensis* in all states of northeast India; *Rattus rattus khyensis* in Mizoram; *R. bowersi* in Meghalaya and Miaoram; *Rattus nitidus nitidus* in Arunachal Pradesh, Meghalaya, and Sikkim; *R. rattus tistae* in Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim, and Tripura; and *Niviventer niviventer* in Meghalaya. It is believed that the outbreak of *Bambusa tulda* and *Dendrocalamus longispathus* is mainly associated with the flowering of the major bamboo variety Thingtam, while that of *Melocanna bambusoides* is associated with the flowering of variety Mautam (Kumar and Pathak 2002). Three rat outbreaks coincided with

Table 2. Major weed flora in different rice cultures in Assam, India.

Weed species	Abundance as major weed in different rice cultures					
	Direct-seeded	TP *Ahu*	TP *Sali*	Wet-seeded	TP *Boro*	DWR
Grasses						
Cynadon dactylon	v					
Digitaria setigera	v					
Echinochloa crus-galli		v	v		v	v
E. stagnina					v	v
Eleusine indica	v			v		
Eragrostis unioloides					v	
Hackelochloa granularis			v			
Hymanachne acutigluma		v				
Isachne himalatica				v		
Leersia hexandra		v	v			
Paspalum conjugatum	v					
Paspalum scrobiculatum			v	v		
Sacciolepis interrupta			v			
Sedges						
Cyperus iria	v	v	v			
C. pilosus					v	
C. rotundus	v					
Eleocharis acutangula			v	v	v	v
E. dulcis			v			
Fimbristylis littoralis	v			v		
Fimbristylis spp.		v				
Scirpus juncoides		v	v			
S. maritimus				v	v	
Other weeds						
Ageratum houstonianum	v					
Cuphea balsamona	v					
Eichhornia crassipes					v	
Fissendocarpa linifolia			v			
Ludwigia adscendens					v	
Melochia corchorifolia	v					
Mimosa pudica	v					
Monochoria vaginalis		v	v	v		
Sagittaria guayanensis		v	v			
Salvinia natanes					v	
Sphenoclea zeylanica			v	v		v
Spilanthes paniculata					v	

DWR = deepwater rice, TP = transplanted.

bamboo flowering in 1911, 1929, and 1956, leading to famine in hilly regions of Assam and other northeast Indian states and forcing migration from the hilly regions to the valleys. The flowering of Thingtam bamboo also occurred in 1977, but extensive crop damage was not observed, which was attributed to control measures set by the government. The next flowering of Mautam bamboo is expected between 2004 and 2007. The Indian Council of Agricultural Research started the All India Coordinated Research Project on Rodent Control in 1977 and gradually established 10 centers, two of which are located in Shellong (Meghalaya) and Jorhat (Assam).

Recent studies in the river valleys in Assam revealed that *B. bengalensis* is the dominant species in rice fields, followed by *B. indica*, *M. booduga*, and *R. sikkimensis* (relative abundance of 59%, 7%, 19.1%, 14.5%, and 5.8%, respectively). Rice tiller cut by rats was estimated at 5.7% in sali, 3.3% in ahu, 5.0% in boro, and 10.0% in deepwater. Tiller damage at the vegetative phase and at panicle initiation, dough, and ripening stages in the sali season was estimated at 2.4%, 3.5%, 7.4%, and 5.7%, respectively. Farmers use local traps, rodenticides, and cats and dogs for rodent control mainly in the homestead. But they rarely make an effort to control rats in rice fields.

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