

Weed communities in rice granary areas in Peninsular Malaysia.

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Abstract

Surveys were conducted in 1989-1990 to ascertain principal weed species in the eight rice granary areas of Kemubu, Besut, Projek Barat Laut Selangor (PBLs), Seberang Perak, Kerian, Seberang Perai and Muda of Peninsular Malaysia. An aggregation of 78 weed species belonging to 53 genera grouped under 33 families was recorded in the granary areas. Of these, 16 species were grasses, 35 broadleaved weeds, 20 sedges and 7 aquatics. Species abundance and dominance for each granary differed remarkably. Kemubu appeared to be the most diversified with 46 species while Seberang Perak had the least number with 26 species. Species diversity rankings for the granaries were as follows: Kemubu > Muda > PBLs > Besut > Kerian > Sungai Manik > Seberang Perai > Seberang Perak although the analyses based on Sorenson's Index of Similarity failed to highlight significant differences in species compositions between them. Quantitative estimates based on Importance Value and other indices showed the dominance and ubiquity status of *Monochoria vaginalis*, *Sagittaria guyanensis*, *Limnocharis flava*, *Fimbristylis miliacea*, *Leptochloa chinensis* and *Echinochloa crus-galli* in the areas surveyed.

Introduction Rice, the third largest agricultural commodity after oil palm and rubber, covering an area of ca. 209.3K ha, is grown principally in eight granary areas in Peninsular Malaysia of Kemubu, Besut, Projek Barat Laut Selangor (PBLs), Seberang Perak, Kerian, Sungai Manik, Seberang Perai and Muda (Figure 1). In each of these granaries, weeds represent a major constraint to increasing yields and weed management is a necessary prerequisite to offset such constraints. Surveys on rice weed community in Peninsular Malaysia have been made by several workers (1 & 2). The most common species were *Monochoria vaginalis*, *Ludwigia adscendens*, *Fimbristylis miliacea*, *Scirpus grossus* and *Limnocharis flava* (2).

The subsequent work of Azmi (1) revealed the predominant of *Echinochloa crus-galli* among forty weed species in the Muda and Seberang Perai granaries. The present study was initiated with the objective, inter alia, to augment available information on the composition, distribution and structure of rice weed communities following perceived changes in the agrotechnical and cultural practices in rice cultivation in major granary areas.

Materials and methods

Surveys on field weeds of rice granary areas were conducted in 1989-1990 in Peninsular Malaysia. For such purpose, samplings were made at random in each area using the list count quadrat (1m x 1m) method. In each location or area, a minimum of six quadrats were taken. Weed species encountered from each quadrat were identified, listed and counted. Speciation in this study follows the nomenclature of Soerjani et al (4). Percentage coverages for each species within the quadrat was also estimated with the

rating scale of 1 to 6 based on the methods of Tjitrosemito and Alex (5). The predominance of a particular species within a community is denoted by its Importance Value (IV) index and this may be calculated using methods of Kim and Moody (3). Comparison of species diversity among weed communities in different granary areas were made using the Sorenson's Index of Similarity.

Results and Discussion

Weed communities in each granary area differed remarkably not only in numerical counts but also in species abundance and dominance (Table 1). Seventy eight weed species belonging to 53

Table 1. Species diversity of rice weeds in Peninsular Malaysia based on family affiliation

Family	Granaries							
	Besut	Kemubu	PBLs	Seberang Perak	Muda area	Seberang Perai	Kerian area	Sg. Manik
Alismataceae	1	1	1	1	1	1	1	1
Amaranthaceae	-	1	-	-	-	-	-	-
Araceae	-	-	-	-	-	-	1	-
Asteraceae	-	-	1	-	-	-	1	-
Azollaceae	1	1	1	-	-	1	1	-
Butomaceae	1	1	1	1	1	1	1	1
Capparaceae	-	-	-	1	-	-	-	-
Characeae	-	-	-	1	-	-	-	-
Commelinaceae	-	-	1	-	-	-	-	-
Convolvulaceae	-	1	-	-	1	-	1	1
Cyperaceae	10	15	7	9	10	6	8	8
Elatinaceae	-	1	-	-	-	-	-	-
Eriocaulaceae	1	1	-	-	-	-	-	-
Euphorbiaceae	-	-	1	-	1	-	-	1
Gentianeae	-	-	-	-	-	-	-	1
Hydrocharitaceae	1	1	2	-	1	-	1	-
Lemnaceae	-	1	1	-	1	2	2	-
Lentibulariaceae	1	-	1	1	1	1	1	1
Lythraceae	-	2	1	-	1	1	1	1
Marsileaceae	1	1	1	-	1	1	1	1
Najadaceae	1	1	1	1	1	1	1	1
Nymphaeaceae	-	-	1	-	1	-	1	-
Onagraceae	2	3	1	1	3	2	2	2
Parkeriaceae	-	-	1	-	1	1	-	1
Poaceae (Graminea)	10	6	6	6	10	6	4	8
Pontederiaceae	1	2	2	2	2	1	1	1
Portulacaceae	-	-	-	-	-	-	-	1
Rubiaceae	-	1	1	-	-	-	-	-
Salvinaceae	-	1	1	-	-	1	1	1
Scrophulariaceae	3	4	2	1	1	2	3	2
Sphenocleaceae	-	-	1	1	1	1	-	-
Sterculiaceae	-	1	1	-	1	-	-	-
Total number of species	34	46	37	26	40	29	33	33

genera under 33 families were recorded in the fields surveyed. Of these 35 were broadleaved weeds, 20 sedges, 16 grasses and 7 aquatics. Kemubu appeared to be the most diversified with 46 species under 20 families while Seberang Perak registered the least number with 26 species grouped under 12 families. Species diversity ranking of weed communities for the granaries were as follows: Kemubu > Muda > PBLs > Besut > Kerian > Sungai Manik > Seberang Perai > Seberang Perak. The prevalence of large number of species of sedges and broadleaved weeds in Kemubu vis-a-vis other granaries, arguably, is a reflection of its contemporary state of agrotechnical and cultural practices - with large acreages of transplanted rice crop and less reliance or minimum usage of herbicides. In the case of Seberang Perak, low species diversity ranking may be attributed to constant usage and wide adoption of chemical control thereby eliminating susceptible species to be dominant. In addition, Seberang Perak was the only area where organized group farming is being practised.

Figure 1 shows the five most dominant weed species in the granaries based on quantitative estimates of relative density, relative dominance, relative frequency and importance value indices.

Further reflection in species diversity of weeds were based on Sorensons Index of Similarity indices whereby only ca. 30% of the species occurred in or common to all the granaries. The overall or pooled indices of IV for the broadleaved weeds, sedges, grasses and aquatic weeds vary considerably denoting hierarchial importance of each group between and within each granary (Figure 2).

The predominant positions of graminoids as key species in Muda, Seberang Perak and to a certain extent PBLs and Sungai Manik granaries, are of concern to farmers and extension agents alike. Understandably, graminoids such as *Echinochloa crus-galli*, *E. colona* and *Leptochloa chinensis* are very competitive vis-a-vis the rice crops. It is not highly speculative to envisage the gradual displacements of easy to control broadleaved weeds and sedges by their grassy components and the need to monitor such changes in their temporal and spatial patterns given the present trend of greater usage of highly selective herbicides and in light of agrotechnical and cultural changes in rice cultivation.

References

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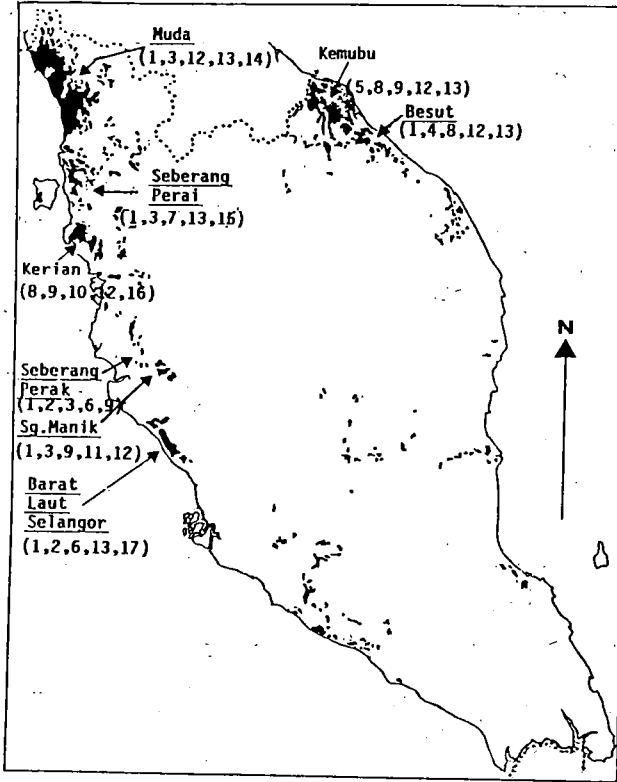


Figure 1. Dominant weed species in Peninsular Malaysia (underlined are direct seeded areas). 1 = *Echinochloa crus-galli*; 2 = *Echinochloa colona*; 3 = *Leptochloa chinensis*; 4 = *Limnophila aromatica*; 5 = *Microcarpaea minima*; 6 = *Ludwigia hyssopifolia*; 7 = *Bacopa rotundifolia*; 8 = *Sagittaria guyanensis*; 9 = *Limnocharis flava*; 10 = *Salvinia molesta*; 11 = *Marsilea crenata*; 12 = *Monochoria vaginalis*; 13 = *Fimbristylis miliacea*; 14 = *Scirpus grossus*; 15 = *Cyperus iria*; 16 = *Rotala indica*; 17 = *Najas graminea*.

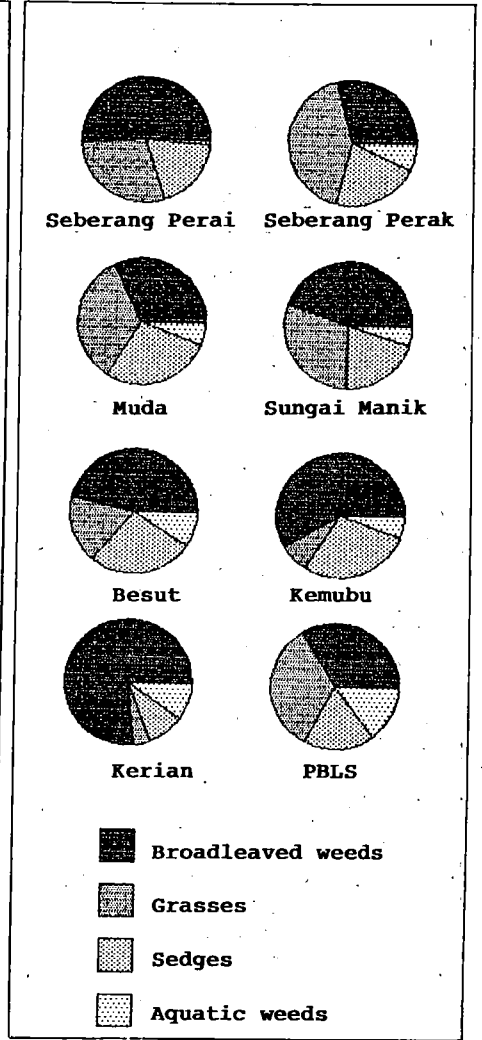


Figure 2. Weed communities in the rice granaries based on pooled importance value (%) indices