SURVEY OF UPLAND RICE WEEDS IN THREE VILLAGES OF MATALOM

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ABSTRACT

Two wet-season surveys of weed species in upland rice areas, following the procedures of Pablico and Moody (1985), were conducted in October 1992 and September 1993 among fifteen farmer-cooperators in three villages of Matalom, Leyte, Philippines. A total of 63 weed species belonging to 48 genera and 21 families were found in the survey areas. Severe infestations (> 60% weed cover) of any of the most common species were not observed in upland rice. The most common weed species in the three barangays were *Stachytarpheta jamaicensis* (L.) Vahl, *Borreria laevis* (Lam.) Griseb., *Axonopus compressus* (Sw.) Beauv. and *Calopogonium mucunoides* Desv.

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KEY WORDS: Percent weed cover. Upland rice. Weed competition. Weed infestation.

INTRODUCTION

Upland rice refers to a system characterized by traditional land preparation, direct seeding in dry soil and complete dependence on rainfall for moisture (Lopez *et al.*, 1980). The most important factor limiting high yields in upland rice is weed competition (personal communication with the farmers).

Reports on surveys of weeds in rice are few, considering that rice is grown on approximately 3.5 ha of land in the Philippines (Pablico and Moody, 1985). Of these reports, surveys conducted on upland fields were not as common as those on lowlands. Hence, a rapid appraisal study of upland rice weeds was conducted in the three villages of Matalom, Leyte: San Salvador, Elevado and Esperanza (Fig. 1) to obtain information on the occurrence and severity of weed infestations in upland rice fields. Knowledge of these different weed species and their distribution could help one formulate strategic weed management schemes.

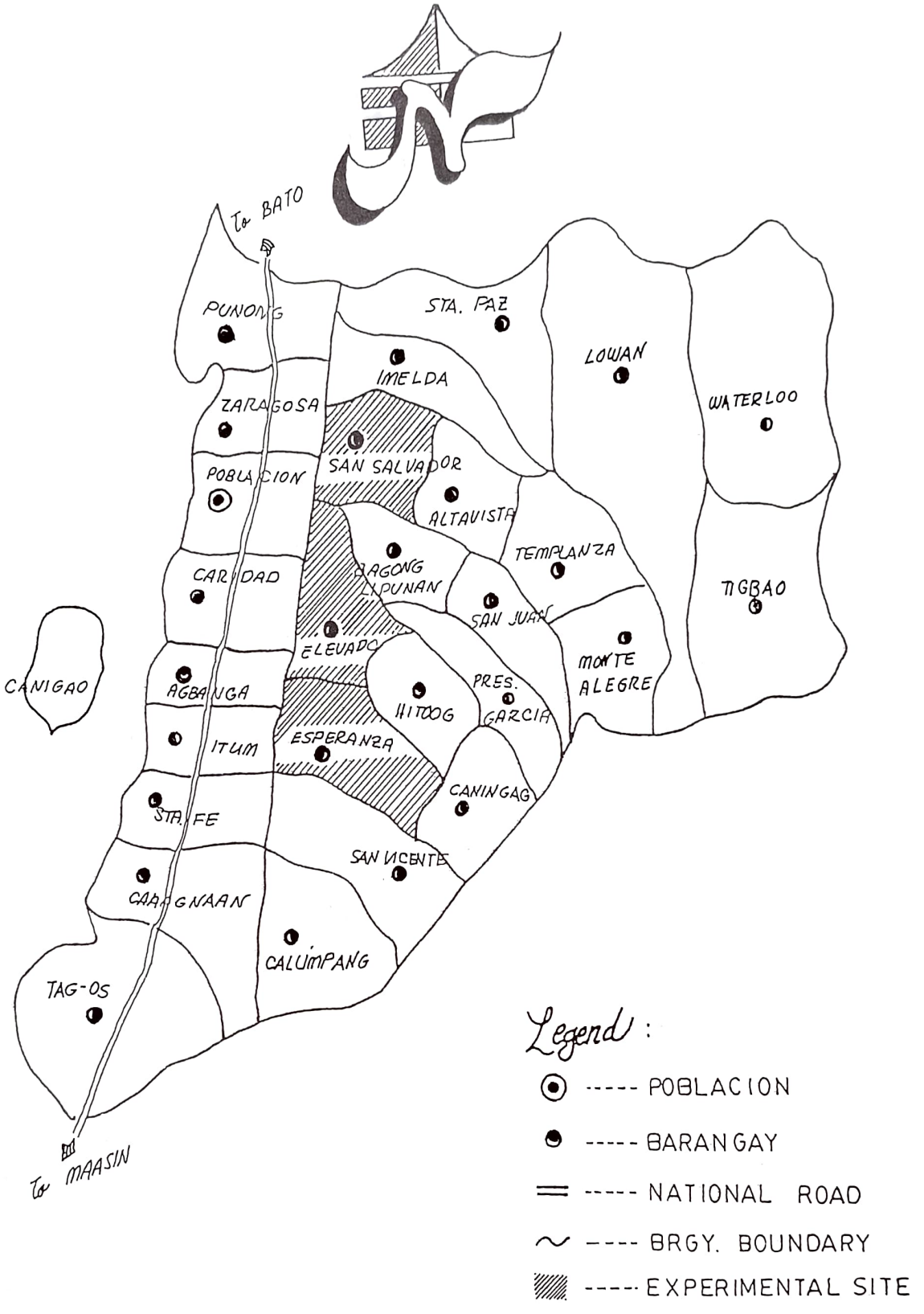

Figure 1. Map of Matalom, Leyte showing Barangays San Salvador, Elevado and Esperanza.

METHODOLOGY

Two surveys of weeds in upland rice at the heading to flowering stages were done in three villages of Matalom in October 1992 and September 1993. Each survey was conducted after the farmers have weeded their fields (90 days after planting), to ensure that only those species which have survived control measures and which may be potential weed problems in upland rice, were recorded. Fifteen farmer-cooperators participated in each survey. Except for the two farmer-cooperators replaced in the second survey, the farms sampled were the same for both surveys. Five farms, each with an average area of 0.2 ha, were utilized in each village.

Two people surveyed each field. The species and their percentage cover were recorded. The percentage cover of weeds below the rice canopy was taken from four randomly selected 1-m^2 areas at each side of the field. The following rating scale was used:

0	= no weeds	**5**	= 41-50% weed cover
tr	= a few scattered weeds	**6**	= 51-60% weed cover
1	= 1-10% weed cover	**7**	= 61-70% weed cover
2	= 11-20% weed cover	**8**	= 71-80% weed cover
3	= 21-30% weed cover	**9**	= 81-90% weed cover
4	= 31-40% weed cover	**10**	= 91-100% weed cover

Results were recorded as averages of two ratings.

RESULTS AND DISCUSSION

A total of 63 weed species belonging to 48 genera and 21 families were found during the two wet-season surveys (Table 1).

The 1992 survey results showed that 55 weed species belonging to 43 genera and 18 families were found in the survey areas (Tables 1 and 2). The number of species ranged from 30 (representing 12 families) in Esperanza to 49 (representing 18 families) in San Salvador. The Poaceae family consisting of 15 species, accounted for 27% of the total weed species. Asteraceae had the next highest (7) species representation followed by Cyperaceae (6). Twenty-five species were common to all villages, while 11, two and one were unique for San Salvador, Elevado and Esperanza, respectively (Table 2).

In 1993, 57 weed species belonging to 44 genera and 19 families were observed in the villages surveyed (Tables 1 and 3). The number of species in the different villages ranged from 33 (representing 15 families) in Esperanza to 45 (representing 16 families) in San Salvador. Similarly,

Table 1. Comparison of weed species observed in upland rice fields of Matalom, Leyte during the wet season (1992 and 1993)[1].

Species	1992	1993
Family Aizoaceae		
Trianthema portulacastrum L.	-	+
Family Asteraceae		
Ageratum conyzoides (L.)	+	+
Emilia sonchifolia (L.) DC.	-	+
Galinsoga parviflora Cav.	+	+
Mikania cordata (Burm. f.) B.L. Robinson	+	+
Pseudelephantopus spicatus (Huss. ex Aubl.) C.F. Baker	+	+
Synedrella nodiflora (L.) Gaertn.	+	+
Vernonia cinerea (L.) Less	+	+
Vernonia patula (Dryland.) Merr.	+	+
Family Caesalpinaceae		
Senna obtusifolia (L.) Irwin and Barneby	+	+
Family Capparidaceae		
Cleome rutidosperma D.C.	+	+
Cleome viscosa L.	-	+
Family Commelinaceae		
Commelina benghalensis L.	+	+
Commelina diffusa Burm. f.	+	+
Murdannia nudiflora (L.) Brenan	+	+
Family Convolvulaceae		
Ipomoea pes-tigridis L.	+	+
Ipomoea triloba L.	+	+
Xenostegia tridentata (L.) Austin and Staples	+	+
Family Cyperaceae		
Cyperus sp.	+	-
Cyperus compressus L.	+	+
Cyperus iria L.	+	-
Cyperus kyllingia Endl.	+	+
Cyperus rotundus L.	+	+
Fimbristylis dichotoma (L.) Vahl.	+	+
Family Euphorbiaceae		
Euphorbia hirta L.	+	+
Phyllanthus fraternus Webster	+	+

Table 1. Continued.

Species	1992	1993
Family Fabaceae		
Calopogonium mucunoides Desv.	+	+
Centrosema pubescens Benth.	+	+
Desmodium triflorum (L.) DC	+	+
Mimosa pudica L.	+	+
Family Lamiaceae		
Hyptis suaveolens (L.) Poit.	+	-
Family Malvaceae		
Malvastrum coromandelianum L. Garcke	-	+
Urena lobata L.	+	+
Family Oxalidaceae		
Biophytum sensitivum (L.) DC	+	+
Family Piperaceae		
Peperomia pellucida (L.) Kunth	-	+
Family Poaceae		
Axonopus compressus (Sw.) Beauv.	+	+
Brachiaria distachya (L.) Stapf	+	+
Brachiaria mutica (Forsk.) Stapf	-	+
Chrysopogon asciculatus (Retz.) Trin.	+	-
Cynodon dactylon (L.) Pers.	+	+
Digitaria ciliaris (Retz.) Koel.	+	+
Digitaria longiflora (Retz.) Perz.	+	+
Digitaria setigera Roth ex Roem and Schult	+	+
Echinocloa colona (L.) Link	+	+
Eleusine indica (L.) Gaertn.	+	+
Ischaemum rugosum Salisb.	+	+
Imperata cylindrica (L.) Raueschel	+	+
Panicum maximum Jacq.	+	+
Paspalum conjugatum Berg.	+	+
Paspalum dilatatum Poir.	+	+
Rottboellia cochinchinensis (Lour.) W.D. Clayton	+	+
Family Portulacaceae		
Portulaca oleracea L.	-	+

Table 1. Continued.

Species	1992	1993
Family Rubiaceae		
Borreria laevis (Lam.) Griseb.	+	+
Borreria latifolia (Aubl.) Schum.	+	+
Borreria ocymoides (Burm.f.)	+	+
Hedyotis racemosa (L.) Lam.	-	+
Hedyotis corymbosa (L.) Lam.	+	+
Family Scrophulariaceae		
Lindernia sp.	+	+
Family Solanaceae		
Physalis angulata L.	+	-
Family Sterculiaceae		
Melochia concatenata L.	+	+
Family Tiliaceae		
Corchorus olitorius (L.)	+	+
Family Verbenaceae		
Lantana camara L.	+	-
Stachytarpheta jamaicensis (L.) Vahl	+	+
Number of species (63)[2]	55	57
Number of genera (48)	43	44
Number of families (21)	18	19

[1] (+) = weed present; (-) = weed absent

[2] Numbers in parentheses represent total values.

Table 2. Weeds observed in upland rice fields in three villages of Matalom, Leyte (wet season, 1992)[1].

Species	Occurrence in each village		
	Esperanza	Elevado	San Salvador
Family Asteraceae			
Ageratum conyzoides L.	+	+	+
Galinsoga parviflora Cav.	-	-	+
Mikania cordata (Burm.f.) G.L. Robinson	-	-	+
Pseudelephantopus spicatus (Huss. ex Aubl. C.F. Baker)	-	-	+
Synedrella nodiflora (L.) Gaertn.	+	+	+
Vernonia cinerea (L.) Less	+	+	+
V. patula (Dryland.) Merr.	-	+	+
Family Caesalpinaceae			
Senna obtusifolia (L.) Irwin and Barneby	-	+	+
Family Capparidaceae			
Cleome rutidosperma D.C.	-	-	+
Family Commelinaceae			
Commelina benghalensis L.	+	+	+
C. diffusa Burm.f.	+	-	+
Murdannia nudiflora (L.)	+	+	+
Family Convolvulaceae			
Ipomoea pes-tigridis L.	-	+	+
I. triloba L.	-	+	-
Xenostegia tridentata (L.) Austin and Staples	-	+	+
Family Cyperaceae			
Cyperus sp.	-	-	+
C. compressus L.	+	+	+
C. iria L.	+	-	+
C. kyllingia Endl.	-	+	-
C. rotundus L.	+	+	-
Fimbristylis dichotoma (L.) Vahl.	-	+	+
Family Euphorbiaceae			
Euphorbia hirta L.	+	+	-
Phyllanthus fraternus Webster	+	+	+

Table 2. Continued.

Species	Occurrence in each village		
	Esperanza	Elevado	San Salvador
Family Fabaceae			
Calopogonium mucunoides Desv.	+	+	+
Centrosema pubescens Benth	+	+	+
Desmodium triflorum (L.) DC	+	+	+
Mimosa pudica L.	+	+	+
Family Lamiaceae			
Hyptis suaveolens (L.) Poit.	-	+	+
Family Malvaceae			
Urena lobata L.	+	+	+
Family Oxalidaceae			
Biophytum sensitivum (L.) DC	+	+	+
Family Poaceae			
Axonopus compressus (Sw.) Beauv.	+	+	+
Brachiaria distachya (L.) Stapf.	-	-	+
Chrysopogon asciculatus (Retz.) Trin.	-	-	+
Cynodon dactylon (L.) Pers.	-	-	+
Digitaria ciliaris (Retz.) Koel	+	+	+
D. longiflora (Retz.) Pers	+	+	+
D. setigera Roth ex Roem and Schult	+	-	-
Echinocloa colona (L.) Link	+	+	+
Eleusine indica (L.) Gaertn.	-	+	+
Ischaemum rugosum Salisb.	+	+	+
Imperata cylindrica (L.) Raueschel	-	+	+
Panicum maximum Jacq.	-	-	+
Paspalum conjugatum Berg.	+	+	+
P. dilatatum Poir.	+	+	+
Rottboellia cochinchinensis (Lour.) W.D. Clayton	-	+	-
Family Rubiaceae			
Borreria laevis (Lam.) Griseb.	+	+	+
B. latifolia (Aubl.) Schum.	-	+	+
B. ocymoides (Burm.f.) DC	+	+	+
Hedyotis corymbosa (L.) Lam.	-	+	+
Family Scrophulariaceae			
Lindernia sp.	-	+	+
Family Solanaceae			
Physalis angulata L.	-	-	+

Table 2. Continued.

Species	Occurrence in each village		
	Esperanza	Elevado	San Salvador
Family Sterculiaceae			
Melochia concatenata L.	+	+	+
Family Tiliaceae			
Corchorus olitorius L.	+	+	+
Family Verbenaceae			
Lantana camara L.	-	-	+
Stachytarpheta jamaicensis (L.) Vahl.	+	+	+
Number of species (55)[2]	30	41	49
Number of genera (43)	23	33	41
Number of families (18)	12	16	18

[1] (+) = weed present; (-) = weed absent
[2] Numbers in parentheses represent total values.

Poaceae had the most number (15) of species. This was followed by Asteraceae with eight and Rubiaceae, five. Twenty-four weed species were observed in all villages surveyed while eight species were found solely in Elevado and five, in San Salvador. One species, *Digitaria setigera* appeared only in Esperanza (Table 3).

Among the most common weed species observed, the following were found in all villages: *Stachytarpheta jamaicensis, Borreria laevis, Calopogonium mucunoides, Axonopus compressus, Cyperus compressus, Ageratum conyzoides* and *Desmodium triflorum* (Table 4). *Mimosa pudica* and *Synedrella nodiflora* were observed only during the 1992 survey. *Cyperus rotundus, Borreria ocymoides, Borreria latifolia* and *Galinsoga parviflora* were among the ten most commonly observed species in Elevado in 1993, while *Melochia concatenata* and *Desmodium triflorum* were important only in Esperanza and San Salvador, respectively. On the other hand, observations in 1992 show *Digitaria longiflora* and *M. pudica* to be among the ten most commonly observed species only in Esperanza while *A. conyzoides* and *Phyllanthus fraternus* were important only in San Salvador. *S. nodiflora* and *B. ocymoides* were observed both in Elevado and San Salvador. Of all these species (Table 4), 13 are broadleaves, three are grasses and two, sedges.

Table 3. Weeds observed in upland rice fields in three villages of Matalom, Leyte (wet season, 1993)[1].

Species	Occurrence in each village		
	Esperanza	Elevado	San Salvador
Family Aizoaceae			
Trianthema portulacastrum L.	+	-	-
Family Asteraceae			
Ageratum conyzoides (L.)	+	+	+
Emilia sonchifolia (L.) DC	-	-	+
Galinsoga parviflora Cav.	-	+	+
Mikania cordata (Burm.f.) B.L. Robinson	-	+	+
Pseudelephantopus spicatus (Huss. ex Aubl.) C.F. Baker	-	-	+
Synedrella nodiflora (L.) Gaertn.	+	+	+
Vernonia cinerea (L.) Less	+	+	+
V. patula (Dryland.) Merr.	-	-	+
Family Caesalpinaceae			
Senna obtusifolia (L.) Irwin and Barneby	-	+	+
Family Capparidaceae			
Cleome rutidosperma DC.	-	-	+
C. viscosa L.	-	+	-
Family Commelinaceae			
Commelina benghalensis L.	-	+	+
C. diffusa Burm.f.	-	+	-
Murdannia nodiflora (L.) Brenan	+	+	+
Family Convolvulaceae			
Ipomoea pes-tigridis L.	+	+	-
I. triloba L.	-	+	+
Xenostegia tridentata (L.) Austin and Staples	-	+	+
Family Cyperaceae			
Cyperus compressus L.	+	+	+
C. kyllingia Endl.	-	+	-
C. rotundus L.	+	+	+
Fimbristylis dichotoma (L.) Vahl	+	-	+
Family Euphorbiaceae			
Euphorbia hirta L.	+	+	+
Phyllanthus fraternus Webster	+	+	+

Table 3. Continued.

Species	Occurrence in each village		
	Esperanza	Elevado	San Salvador
Family Fabaceae			
Calopogonium mucunoides Desv.	+	+	+
Centrosema pubescens Benth.	+	-	+
Desmodium triflorum (L.) DC	+	+	+
Mimosa pudica L.	+	-	+
Family Malvaceae			
Malvastrum coromandelianum L. Garcke	-	-	+
Urena lobata L.	+	-	+
Family Oxalidaceae			
Biophytum sensitivum (L.) DC.	+	+	+
Family Piperaceae			
Peperomia pellucida (L.) Kunth	-	+	-
Family Poaceae			
Axonopus compressus (Sw.) Beauv.	+	+	+
Brachiaria distachya (L.) Stapf	-	+	+
B. mutica (Forsk.) Stapf	+	+	-
Cynodon dactylon (L.) Pers.	-	-	+
Digitaria ciliaris (Retz.) Koel	-	+	+
D. longiflora (Retz.) Perz.	+	+	+
D. setigera Roth ex Roem and Schult	+	-	-
Echinocloa colona (L.) Link	+	+	+
Eleusine indica (L.) Gaertn.	-	+	+
Ischaemum rugosum Salisb.	+	+	+
Imperata cylindrica (L.) Raueschel	-	+	-
Panicum maximum Jacq.	-	+	+
Paspalum conjugatum Berg.	+	+	+
P. dilatatum Poir.	+	+	+
Rottboellia cochinchinensis (Lour.) W.D. Clayton	-	+	-
Family Portulacaceae			
Portulaca oleracea L.	-	+	-
Family Rubiaceae			
Borreria laevis (Lam.) Griseb.	+	+	+
B. latifolia (Aubl.) Schum.	+	+	+
B. ocymoides (Burm.f.)	+	+	+
Hedyotis racemosa Lam.	-	+	-
H. corymbosa (L.) Lam.	+	-	+

Table 3. Continued.

Species	Occurrence in each village		
	Esperanza	Elevado	San Salvador
Family Scrophulariaceae			
Lindernia sp.	+	+	+
Family Sterculiaceae			
Melochia concatenata L.	+	+	+
Family Tiliaceae			
Corchorus olitorius (L.)	+	+	+
Family Verbenaceae			
Stachytarpheta jamaicensis (L.) Vahl.	+	+	+
Number of species (57)[2]	33	44	45
Number of genera (44)	28	35	39
Number of families (19)	15	17	16

[1] (+) = weed present; (-) = weed absent.
[2] Numbers in parentheses represent total values.

In 1992, three broadleaf weeds, namely: *C. mucunoides, B. laevis* and *S. jamaicensis* occurred in 100% of the fields (Table 5). Of the 14 species listed, 10 are broadleaves, three are grasses and one is a sedge.

In the 1993 survey, 16 species were found, composed of 10 broadleaves, four grasses and two sedges (Table 6). *B. laevis*, which was the most commonly observed species in all the villages, occurred in 93% of the fields. An additional 12 were noted to be present in more than 50% of the fields while the remaining three were observed in more than 30% of the fields.

Differences in results of the two surveys may be due in part to (a) differences in the location of fields surveyed since some farmers opted to plant crops other than upland rice after the first survey, hence the need to replace them with other farms planted to rice during the second survey, (b) effect of weed control practice wherein some farmers weed their rice as soon as weeds emerged while others weed only once or not at all, having other farm activities, and (c) different sampling dates. The first survey was conducted at a much later date (October 1992) because of the drought that hit Matalom during that season. The drought caused late flowering in rice as well as non-emergence of weed species which depend on moisture for germination. The second sampling was done at the right time (September 1993) when every environmental factor seemed favorable for weed growth.

Table 4. Most common weed species in upland rice fields in three villages of Matalom, Leyte (wet seasons 1992 and 1993)[1].

Weed Species	Esperanza	Elevado	San Salvador
Ageratum conyzoides	2	2	(2)-
Axonopus compressus	(2)2	(1)1	(1)2
Borreria laevis	(1)1	(1)2	(1)1
B. latifolia	-	2	-
B. ocymoides	-	(1)2	(1)-
Calopogonium mucunoides	(1)1	(1)2	(1)2
Cyperus compressus	(3)2	(2)-	(1)1
C. rotundus	-	2	-
Desmodium triflorum	(2)-	(1)-	(1)1
Digitaria longiflora	(1)2	-	3
Galinsoga parviflora	-	2	-
Melochia concatenata	(1)1	(1)-	-
Mimosa pudica	(2)		
Paspalum dilatatum	(1)1	(1)-	3
Phyllanthus fraternus	-	2	(2)1
Stachytarpheta jamaicensis	(1)3	(1)2	(1)2
Synedrella nodiflora		(1)	(2)
Vernonia cinerea	1	-	2

[1] Numbers indicate rank (1 = most observed; 3 = least observed); a dash (-) indicates that a species is not ranked among the first ten; numbers in parentheses represent ranks of species in the 1992 wet season.

Table 5. Severity of infestation of the most common weed species in upland rice fields in three villages of Matalom, Leyte (1992 wet season).

Weed Species	Weed Infestation (% cover)[1]												
	tr	1	2	3	4	5	6	7	8	9	10	Total	
B. laevis	1	6	6	1	1	-	-	-	-	-	-	15	(100)
C. mucunoides	4	4	5	1	1	-	-	-	-	-	-	15	(100)
S. jamaicensis	5	6	4	-	-	-	-	-	-	-	-	15	(100)
A. compressus	7	6	1	-	-	-	-	-	-	-	-	14	(93)
D. triflorum	12	1	1	-	-	-	-	-	-	-	-	14	(93)
B. ocymoides	11	1	1	-	-	-	-	-	-	-	-	13	(87)
M. concatenata	11	2	-	-	-	-	-	-	-	-	-	13	(87)
C. compressus	4	6	2	-	-	-	-	-	-	-	-	12	(80)
P. dilatatum	8	4	-	-	-	-	-	-	-	-	-	12	(80)
D. longiflora	5	4	2	-	-	-	-	-	-	-	-	11	(73)
S. nodiflora	8	1	2	-	-	-	-	-	-	-	-	11	(73)
A. conyzoides	6	4	-	-	-	-	-	-	-	-	-	10	(67)
P. fraternus	10	-	-	-	-	-	-	-	-	-	-	10	(67)
M. pudica	9	-	-	-	-	-	-	-	-	-	-	9	(60)

[1] tr = a few scattered plants, 1 = 1-10%, 2 = 11-20%, 3 = 31-40%, 5 = 41-50%, 6 = 51-60%, 7 = 61-70%, 8 = 71-80%, 9 = 81-90%, 10 = 91-100%. Percentage of infested fields indicated in parentheses.

Table 6. Severity of infestation of the most common weed species in upland rice fields in three villages of Matalom, Leyte (1993 wet season).

Weed Species	Weed Infestation (% cover)[1]												
	tr	1	2	3	4	5	6	7	8	9	10	Total	
B. laevis	3	7	2	-	1	1	-	-	-	-	-	14	(93)
A. compressus	9	3	1	-	-	-	-	-	-	-	-	13	(87)
C. mucunoides	7	3	3	-	-	-	-	-	-	-	-	13	(87)
P. fraternus	12	-	-	-	-	-	-	-	-	-	-	12	(80)
A. conyzoides	9	1	-	1	-	-	-	-	-	-	-	11	(73)
C. compressus	7	3	-	1	-	-	-	-	-	-	-	11	(73)
S. jamaicensis	7	3	1	-	-	-	-	-	-	-	-	11	(73)
P. dilatatum	8	2	-	-	-	-	-	-	-	-	-	10	(67)
V. cinerea	10	-	-	-	-	-	-	-	-	-	-	10	(67)
D. longiflora	7	1	1	-	-	-	-	-	-	-	-	9	(60)
D. triflorum	9	-	-	-	-	-	-	-	-	-	-	9	(60)
M. concatenata	8	1	-	-	-	-	-	-	-	-	-	9	(60)
B. ocymoides	8	-	-	-	-	-	-	-	-	-	-	8	(53)
C. rotundus	5	1	-	1	-	-	-	-	-	-	-	7	(47)
B. latifolia	3	1	2	-	-	-	-	-	-	-	-	6	(40)
G. parviflora	2	-	1	1	1	-	-	-	-	-	-	5	(33)

[1] tr = a few scattered plants, 1 = 1-10%, 2 = 11-20%, 3 = 31-40%, 5 = 41-50%, 6 = 51-60%, 7 = 61-70%, 8 = 71-80%, 9 = 81-90%, 10 = 91-100%. Percentage of infested fields indicated in parentheses.

Although it is best to have more sample farms in this kind of study, some farmers, because of their belief that disturbing the rice fields during the heading to flowering stage results in a lower yield, refused to take part in the survey, hence the limitation.

Severe infestations (ratings of≥6) of any of the most common species were relatively rare in both seasons. This may be attributed to the time of sampling when farmers had weeded or applied control measures in their fields.

The results implied that as long as the farmers hand weed or apply control measures in their fields at the proper time, weed species that might pose problems in upland fields will be at a minimum. The need to keep upland fields weed-free will ensure good crop establishment and reduce crop infestation at a tolerable rate.

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