

Three sources introduced *Pomacea* spp. in the Philippines:
P. canaliculata via Taiwan from Argentina to Lemery, Batangas, Luzon, 1982.

P. gigas from Florida (USA) to Makati, Metro Manila, 1983.
Pomacea snails directly from Argentina to Asturias, Cebu, in 1984.
An African snail, *Pila*

leopardivillensis d’Orbigny, was also introduced from Taiwan. *P. cuprina* (Reeve) is also found in the Philippines. □

Soil and Crop Management

Puddling methods for lowland rice

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We studied the effect of puddling methods on lowland rice (Paiyur 1 variety) during Jun-Sep kharif and Oct-Jan (winter) seasons 1982-83. Puddling twice with an iron plow followed by one puddling with a helical blade puddler produced the highest grain yield and net income (see table). □

Effect of puddling method on grain yield and return. Tamil Nadu, India.

Puddling method	Grain yield (t/ha)		Cost of cultivation (\$/ha)		Net income (\$/ha)	
	Kharif	Winter	Kharif	Winter	Kharif	Winter
Puddling 3 times with iron plow (conventional)	6.0	4.7	353	339	625	424
Puddling twice with iron plow and once with helical blade puddler	6.4	5.0	337	323	701	492
Puddling twice with country plow and once with helical blade puddler	5.4	4.2	321	329	562	354
Puddling once with iron plow and twice with helical blade puddler	5.7	4.4	327	313	604	401
CD (0.05)	0.6	0.4				

Effect of spacing and seedlings per hill

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We studied the effect of spacing and seedlings per hill in the 1985 dry season. Short-duration rice variety ADT36 was transplanted at 60 d after seeding. The experiment used 3 spacings (12.5 × 10.0 cm with 80 hills/m², 15.0 × 10.0 cm with 66 hills/m², and 20.0 × 10.0 cm with 50 hills/m² and 2, 4, 6, and 8 seedlings per hill in a randomized block design. NPK at 75-17-31 kg/ha were applied. N was split: 50% as basal, 25% 15 d after transplanting (DT), and 25% 30 DT.

The primary tillers produced panicles, within 21 DT, but these panicles shattered before harvest. In spite of reduced tillers/hill, panicle weight, and number of filled spikelets/panicle, 12.5- × 10.0-cm spacing produced significantly higher

Effect of spacing and seedlings/hill on yield parameters of short-duration rice. ^a Tamil Nadu, India, 1985 dry season.

Treatment	Tillers/hill	Tillers/m ²	Panicle weight (g)	Spikelets/panicle	Grain yield (t/ha)
<i>Spacing</i>					
12.5 × 10.0 cm	6.6 b	528 a	1.41 a	46 b	4.0 a
15.0 × 10.0 cm	7.0 a	425 b	1.44 a	51 ab	3.6 b
20.0 × 10.0 cm	7.3 a	371 c	1.48 a	53 a	3.3 c
<i>Seedlings/hill</i>					
2	7.4 a	466 a	1.81 a	62 a	4.8 a
4	6.9 ab	442 b	1.38 b	50 b	3.6 b
6	6.7 ab	422 c	1.35 b	47 b	3.1 c
8	6.6 b	416 c	1.21 c	41 c	2.9 c

^a In a column within each group, means followed by the same letters are not significantly different at the 5% level.

grain yield, mainly because of higher numbers of tillers/unit area (see table).
Increasing the number of

seedlings/ hill had an adverse effect. All yield parameters were reduced with more than 2 seedlings/hill. □

Performance of rice varieties on floating rafts

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Rice cultivation on floating rafts, a technique developed at the College of Agriculture, is suitable for flooded areas (see figure). The system saves the labor and electricity needed to drain an area for a single dry season rice crop. Rice

can be raised year round with this system.

Bamboo platforms were attached to two large airtight oil drums. The tops of the rafts were covered with damaged gunny sacks and a thin 7.5-cm layer of rice soil was spread over the surface.

We compared the performance of 10 short-duration rice varieties on 3- × 3-m floating rafts with 3 replications. Seedlings were transplanted 18 d after seeding in Jun 1985 (wet season).

Crop growth was satisfactory (see table). □

Growth characteristics, yield attributes, and yield of rice varieties grown on floating rafts. Vellayani, India, 1985 kharif.

Variety	Height (cm)	Tillers/hill	Productive tillers/hill	Percentage of panicles/hill	Panicle length (cm)	Filled grains/panicle	Grain yield (t/ha)	Straw yield (t/ha)
Cul. 170	62	28	26	93	14	36	4.0	6.9
Cul. 8	92	27	23	85	18	30	4.0	6.7
Karthika	102	25	22	88	20	30	2.0	5.0
Mo-5	90	28	22	78	19	32	2.7	6.8
Pavizham	95	21	16	76	18	25	2.1	6.1
Mo-4	100	11	9	82	19	22	1.7	6.9
Triveni	102	21	18	82	19	39	4.6	6.4
Bhadra	82	18	16	89	17	32	2.7	6.8
Kochuvithu	110	14	10	71	20	21	2.0	5.5
Cul. 93	105	23	20	87	20.5	43	4.7	8.7

Effect of land preparation on control of *Paspalum distichum*

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We tested tillage to control perennial grass weed *Paspalum distichum* L. in transplanted rice in Guimba, Nueva Ecija, Philippines.

Total dry weed weight in unweeded plots was highest with 1 plowing + 3 harrowings by hand tractor; *Echinochloa glabrescens* Munro ex Hook. f. accounted for the bulk of the weed growth (see table).

The intensive soil turning by the hand tractor reduced growth of *P. distichum*, but not significantly. It could have brought seeds of *E. glabrescens* to the

surface or scarified them, resulting in increased germination and growth. Or, an allelopathic substance that might be released by *P. distichum* reduces growth of *E. glabrescens*. Tall-growing annual grass *E. glabrescens* also might have competed with and reduced growth of shorter *P. distichum*.

The significant yield reduction was the result of weed competition, probably because of increased growth of *E. glabrescens*. No significant yield differences were found in the plots treated with butachlor or hand weeded. This indicates that *P. distichum* can be reduced with good land preparation and the annual grass population that may increase can be checked by butachlor. □

Effect of modified urea materials and N levels on transplanted rice

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Split application of urea and modified urea materials was tested in 1985 kharif.

In a field experiment laid out on a deep Vertisol (pH 7.5, 0.61% organic C, CEC 20.6 meq/ 100 g, 25.3 kg available P (Olsen)/ ha, 4.6 meq exchangeable K/ 100 g, 0.2 ppm available Zn and silty clay texture). At the last puddling, 26.4

Effect of modified urea and N level on transplanted rice. Kota, India, 1985 kharif.

Treatment ^a	Grain yield (t/ha)	Panicles (no./m ²)
Control (no N)	2.2	181.3
58 kg N/ha PU-BS	3.9	214.8
PU-SS	3.9	213.3
SCU-basal	4.0	237.5
USG-placement	4.1	270.0
MPCU-basal	3.9	219.0
87 kg N/ha PU-BS	4.6	241.5
PU-SS	4.5	238.3
SCU-basal	5.9	269.8
USG-placement	6.1	270.3
MPCU-basal	4.8	249.8
116 kg N/ha PU-BS	6.0	287.8
PU-SS	5.8	296.3
SCU-basal	6.0	316.8
USG-placement	6.1	329.0
MPCU-basal	5.6	268.5
CD	(0.05) 0.338.3	

^aPU-BS = prilled urea, local best split, PU-SS = prilled urea, standard split, SCU-basal = sulfur-coated urea, USG-placement = urea supergranules, and MPCU-basal = Mussooriephospho-coated urea.

Total weed weight and weight of *Echinochloa glabrescens* and *Paspalum distichum* in the unweeded plots as affected by tillage levels, and grain yield as affected by different weeding regimes.^a Nueva Ecija, Philippines.

Tillage treatment	Weed weight (g/m ²)			Grain yield (t/ha)		
	<i>Echinochloa glabrescens</i>	<i>Paspalum distichum</i>	Total	No weeding	Hand weeding (21 and 35 DT)	Butachlor (0.6,3 DT)
1 plowing + 3 harrowings (within 1 mo before transplanting)	180 a	30 a	274 a	2.1 a	2.7 a	2.6 ab
1 plowing + 3 harrowings (within 2 mo before transplanting)	159 a	37 a	259 a	1.9 a	2.6 a	2.2 b
1 plowing + 3 harrowings (harrowing by hand tractor)	418 b	8 a	578 b	0.9 b	2.4 a	2.6 ab
2 plowings + 3 harrowings (animal)	53 a	60 a	141 a	2.3 a	2.0 a	2.3 b
1 plowing + 5 harrowings (animal)	127 a	62 a	214 a	2.3 a	2.6 a	3.0 a

^aIn a column, means followed by the same letter are not significantly different at the 5% level by DMRT. DT = days after transplanting.