When the seeds were broadcast on the soil surface, germination was significantly higher in flooded soil than in saturated soil, indicating that high moisture favors germination. For seeds mixed in the top 1 cm of soil, germination was significantly higher in saturated than in flooded soil, indicating the need for oxygen in addition to light for germination. Flooding restricts oxygen diffusion into the soil profile. Therefore, the oxygen content of soil close to the surface was probably higher under saturated than under flooded conditions.

Few seedlings emerged when the seeds were placed 1 cm deep. Lack of light, low oxygen concentration, increasing carbon dioxide concentration, and toxic gaseous products of anaerobic decomposition were probably involved. Thus, germination of *C. difformis* can be substantially reduced by flooding and deep plowing. □

Pest Control and Management

WEEDS

Effect of preemergence herbicides on *Echinochloa crus-galli* (L.) Beauv. and *Cyperus difformis* L. in transplanted rice

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In 1982 monsoon season we studied the efficacy of individual and combinations of herbicides molinate + 2,4-D, oxyfluorfen, oxadiazon, thiobencarb, butachlor, pendimethalin, and 2,4-D sodium salt.

Weeds in the experiment field were grasses *Echinochloa crus-galli* (L.) Beauv., *E. colonum* (L.) Link, *Paspalum* sp.; sedges *Cyperus difformis* L., *C. iria, Fimbristylis miliacea* L., and *Scirpus* sp.; and broadleaves and aquatics *Eclipta* alba (L.) Hassk, *Ammannia baccifera* L., *Marsilea quadrifolia* L., *Monochoria vaginalis* L., *Rotala densiflora,* and *Ludwigia parviflora. E. crus-galli* and *C. difformis* predominated and were effectively controlled by the herbicide treatments.

Effect of preemergence herbicides on weeds and transplanted rice, Coimbatore, India.[a]

Treatment	Herbicide dose (kg ai-ae/ha)	Weeds/m^2 at 30 DT			Total weed dry matter (g/m^2) at 30 DT	Productive tillers (no./m^2)	Grain yield (t/ha)
		E. crus-galli	*C. difformis*	Total grass, sedge, and broadleaves			
Molinate + 2,4-D	1.5 0.5	4	–	25	3	396	4.7
Molinate + 2,4-D	2.0 0.5	7	9	29	6	420	5.0
Molinate + 2,4-D	2.5 0.5	5	12	49	7	400	4.4
Oxyfluorfen	0.15	27	12	49	16	380	4.4
Oxadiazon	0.75	–	4	19	8	444	5.4
Thiobencarb	1.5	5	15	44	9	416	5.1
Butachlor	1.5	12	17	77	8	420	4.8
Pendimethalin	1.25	7	13	25	5	464	5.5
2,4-D sodium salt	0.8	9	19	43	7	424	4.0
Hand weeding at 15 and 35 DT		21	4	112	6	420	5.0
Unweeded control		57	52	128	14	336	3.5
CD		3	3	29	2	44	0

[a] DT = days after transplanting.

Molinate + 2,4-D gave a broad spectrum of weed control. Molinate + 2,4-D, oxadiazon, and pendimethalin reduced weed dry matter production and increased productive rice tillers. Preemergence application of pendimethalin at 1.25 kg/ha followed by one hand weeding gave the highest grain yield (5.5 t/ha), followed by oxadiazon 0.75 kg/ha (see table). □

Major lowland rice weeds of Koraput District, Orissa

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Rice is the major kharif crop in the lowlands of Koraput District. Weed population in blocks throughout the district was randomly sampled in 1982 and 1983 and the following weed groups were identified as the most common and problematic in rainy season. There were 31 problem weeds — 12 sedges, 10 grasses, 8 broad-leafed weeds, and 1 fern.

Sedges. *Cyperus rotundus, C. iria, C. imbricatus, C. amabilis, C. exaltatus, C. diffomis, C. compactus, C. articulatus, Fimbristylis dichotoma, F. miliacea, Rhynchospora corymbosa, Scirpus articulatus.*

Grasses. *Echinochloa colona, E. crus-galli, Brachiara distachya, Leptochloa chinensis, Digitaria sanguinalis, Eleusine indica, Dactyloctenium aegyptium, Panicum texanum, Eragrotis atrovirens, Oryza sativa* (wild rice).

Broad-leafed weeds. *Commelina diffusa, Ludwigia perennis, Sesbania exaltata, Aeschynomene indica, Heteranthera reniformis, Oxalis corniculata, Hydrolea zeylanica, Portulaca oleracea.*

Fern. *Marsilea quadrifolia.* □