

Weed control

shows high resistance to drying out — otherwise reinfestation will occur from the weeded swaths.

Promising herbicides

Atrazine, presently used widely in northern Cameroon to treat maize cropfields, shows some efficacy. Cropping maize, in atrazine-treated fields, in rotation with cotton is therefore of considerable interest.

This type of crop rotation could be of even further interest if experiments in maize cropfields, now under way in tropical regions, confirm the excellent behaviour of new pre-emergence herbicide products (Table 1) against *C. benghalensis*, particularly in association with atrazine.

Table 1. Examples of new pre-emergence herbicide products presently being tested in maize cropfields.

Active ingredient	Commercial name	Concentration (g/l)	Manufacturer	Dose active ingredient (g/ha)	Dose commercial product (l/ha)
acetochlor + atrazine	JF 12112 + atrazine (1)	768	ICI	1 000 + 1000	1.3 + 2
aclonifen + atrazine	Challenge M	250 + 250	Rhône-Poulenc	1 000 + 1 000	4
metazachlor + atrazine	Pree + atrazine (1)	400	BASF	600 to 800 + 1 000	1.5 to 2 + 2
metolachlor + atrazine	Primagram (reference)	250 + 250	Ciba-Geigy	1 000 + 1 000	4

(1): many extemporaneously-mixed atrazine formulation are being tested.

Imperata cylindrica

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Botanical name:
Imperata cylindrica (L) Palisot
de Beauvois
Family: *Poaceae*
Class: Monocotyledons
Distribution: humid tropical regions
International code: IMPCA
Vegetative propagation: rhizomes

An aggressive weed

Imperata cylindrica (L.) P. Beauv. develops in tufts of ribbon-like, upright leaves with pointed apices. The rigid, cylindrical stem bears a spiciform, downy inflorescence, silvery-white in colour.

I. cylindrica is a perennial species that mainly multiplies vegetatively by extension of a vigorous rhizome system. As an alternative means of propagation, its seeds can also be dispersed widely by the wind. Fires, cutting and grazing induce regrowth and

stimulate flowering. Rhizomes can penetrate to 120 cm depth in the soil.

I. cylindrica, widely distributed in tropical regions, is very abundant in humid savanna regions (Sudano-Guinean). This sun-loving species mainly grows as a weed in cropfields or as a ruderal plant along roadsides and in open spaces. It has no special soil preferences. Its field expansion is highly favoured by soil working (tilling, weeding, earthing-up). In particular, disk ploughing in rainy periods enhances propagation of this weed.

A difficult species to control

Regardless of the weeding method used, control of *I. cylindrica* populations must be done as soon as the first plants appear, through focused spot treatments. Heavy overall treatments are necessary if the operations are carried out once the population is well established. After weeding of *I. cylindrica*, the land must be cultivated immediately to enable the crop cover to compete with any weed plants that were not destroyed.



Aerial parts can be slashed down with a machete when the fields are being prepared, followed by weeding during cultivation. These operations hamper *I. cylindrica* development, but are not enough to eliminate it. The technique of crushing the weed stems beneath planks, as practised in Indonesia before cultivation, leads to the same result.

Control via soil tillage and rapid cropping

Mouldboard ploughing at the beginning of the dry season and uprooting with toothed cultivators unearth the rhizome fragments, after which they

Table 1. Non-selective, systemic, post-emergence herbicides that are effective against *I. cylindrica*.

Active ingredient	Commercial name	Concentration (g/l)	Manufacturer	Dose active ingredient (g/ha)	Dose commercial product (l/ha)
Reference					
Glyphosate	Round-up	360	Monsanto	2 880	8.0
Sulfosate	Ouragan	480	I.C.I.	2 880	6.0
Glufosinate	Basta	200	Hoechst	2 000	10.0
Imazapyr (residual)	Arsenal	75	Cyanamid	450	6.0
Glufosinate (+) imazapyr	Basta (+) Arsenal	200 75	Hoechst Cyanamid	1 000 (+) 225	5.0 (+) 3.0
(+): extemporaneous mixture					

dry out. In western Africa (Côte d'Ivoire, Benin) and central Africa (Congo), good weed eradication is obtained by ploughing to 25-30 cm depth (and repeated the next-year), followed by cropping and field maintenance.

Smothering with a cover crop is also possible. In the Congo, 2 years of fallows with *Pueraria phaseoloides* (Roxb.) Benth. was effective in controlling *I. cylindrica*.

Recommended herbicide techniques

No selective herbicides are effective against *I. cylindrica*. Non-selective contact herbicides, such as paraquat, just destroy the foliage, and only non-selective systemic herbicides affect the rhizomes. Glyphosate, at a dose of 2 880-3 600 g/ha, is the reference product. However, different *I. cylindrica* populations show considerable variations in their susceptibility to this product. Before planning overall treatments, it is therefore recommended to carry out tests at different doses in order to determine the optimum effective dose.

With respect to the reference treatment (Table 1), glyphosate treatments may be improved in two ways:

- splitting the dose, and conducting two treatments with a 3 week interval;

- adding a surfactant to improve leaf penetration, thus lowering the treatment dose by about a third.

Some non-selective herbicides show high efficacy against *I. cylindrica* (Table 1).

Herbicides that only penetrate the leaves (e.g. glyphosate, glufosinate and sulfosate) have no residual effect. It is therefore possible to plant a crop as early as the day after the herbicide treatment, except in extremely sandy soils where the product can dissolve in the soil solution and destroy the young seedlings at germination.

Imazapyr, in contrast, penetrates both the leaves and roots and remains persistent in the soil. It is essential to delay cropping after treatments with this product. The length of this delay will depend on soil conditions, climate and cropping practices, but can be as long as several months.

For at least 15 days, it is very important not to disturb (by mechanical interventions, weeding, etc.) populations of weeds treated with these slow-acting systemic products.