WEED CONTROL IN CASSAVA

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SUMMARY

DNPB, CMU, atrazine, linuron fluometuron, metabromuron, chloroxuron, diuron, ametrine, prometrine, neburon, simazine, atraton, fenac, 2-4D ester, MCPA, MCPA + PCP and 2-4D + PCP at various rates have been tested previously as weedicides for cassava and results are briefly reviewed.

New, careful experiments at two planting dates compared a short list of the more promising chemicals from the above list. Fluometuron 2.0 kg/ha a.i., prometrine 2.0 kg/ha a.i., atrazine 2.0 kg/ha a.i., difenamid 3.0 kg/ha a.i. were compared with a weedy check. Fluometuron appeared to be the best.

RESUME

Des taux variés de DNP, de CMU, d'atrazine, de linuron, de fluométuron, de métabromuron, de chloroxuron de diuron, d'amétrine, de prométrine, de néburon, de simazine, d'atraton de fénac, d'éther 2-4D, de MCPA, de MCPA + PCP et 2-4D + PCP ont été précédemment testés comme herbicides pour le manioc et les résultats qui en sont issus ont été brievement passés en revue.

De nouveaux essais menés avec précaution à deux dates de semis ont permis de comparer un nombre réduit de produits chimiques les plus staisfaisants dans la liste ci'dessus. Le fluométuron 2.0 kg/ha i.a., le prométrine, 2.0 kg/ha i.a., l'atrazine 2.0 kg/ha i.a., le difémaded 3.0 kg/ha i.a. ont été comparés sur un témoin adventice. Le fluométuron s'est révélé le plus satisfaisant.

RESUMEN

Se revisan brevemente los resultados de pruebas previas en las que DNPB, CMU, atrazina, linuron, fluometurón, metabromurón, chloroxurón, diurón, ametrine, prometrine, neburón, simazine atratón, fenac, 2-4 D ester, MCPA, MCPA + PCP y 2-4D + PCP en varias dósis, han sido empledos como herbicídas en yuca.

En nuevos y cuidadosos experimentos en donde se usaron dos épocas de siembra, se comparon unos cuantos de los más prometedores productos cuímicos de la lista que se mencionó antes. Se compararon fluometurón 2.0 kg/ha i.a., prometrina 2.0 kg/ha i.a., atrazina 2.0 kg/ha i.a., difenamida 3.0 kg/ha i.a., con un testigo enhierbado. El mejor pareció ser fluometurón.

INTRODUCTION

Cassava (*Manihot esculenta* Crantz), as other crops, is affected by weeds. These reduce its production due to competition for nutrients, water and light.

Throughout the life of the crop, production of carbohydrate is greater day by day, on a unit area basis than that of cereal crops. The habitat of cassava is in the hot humid tropical and subtropical regions, where a great part of the human population lives and where conditions generally are not favourable for cereal crops.

The world's total production of cassava is about 100 x 10^6 t., and the mean yield is 10 t/ha[6]. This mean yield is very low when compared with those yields obtainable in experimental trials[15, 16, 17].

As a substitute for cereals, cassava meals and pellets have been increasingly used in recent years. Increased yields can be obtained both by use of improved cultivars and by cultural practices including efficient chemical control of weeds.

REVIEW

The Venezuelan Institute of Agronomy (U.C.V.) has been testing pre-emergence herbicides such as DNBP, CMU and Atrazone since 1963, but no results have been published[14].

At Cagua, Venezuela, the Shell Service for Farmers[3] tested substituted ureas and triazines. These damaged the crop when applied at 19 and 60 days after planting. The most promising products were fluometuron, linuron and metabromuron. Subsequent trials indicate the value of fluometuron applied at 2 kg/ha of product (80 percent a.i.).

The use of substituted urea herbicides has also been reported by Silva[22] from Minas Gerais, Brazil. The evaluation there was made on the basis of the weight of roots, foliage and branches. The best results were obtained with linuron, followed by diuron, cloroxuron and fluometuron.

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No damage to cassava was found by Kasasian[8], when amiben, atrazine, prometrine, ametrine and diuron were used at doses of 2.25 to 4.50 kg/ha. There was also no damage to cassava from applications of 3.7 to 6.7 kg/ha of neburon, 5.6 to 11.2 kg/ha of TCA or PCP, 2.25 kg/ha of simazine with 5.6 kg/ha of atraton or 3.5 kg/ha of fenac. The crop was, however, affected by 6.7 kg/ha of fenac. Bouriquet[2] showed the following products effective for cassava weed control: 1.6 to 1.8 kg/ha of 2-4D ester; 4.8 kg/ha MCPA sodium salt; 1.6 kg/ha MCPA + 3.5 lt/ha of PCP.

According to Goaring[7], 2-4D acid, MCPA, 2-4D + PCP; monouron and simazine were all rather toxic to cassava. Amiben at 3.5 to 6.7 kg/ha, applied at planting time, was recommended by Mortensen and Bullard[20].

MATERIAL AND METHODS

Environmental conditions

The trial now described was carried out at Maracay, Venezuela. Lat. N 10° 17'00"; Long. W67° 37'00"; alt. 455 m. The mean annual temperature is 24.5° C; the soil is a slightly acid alluvial sandy loam.

Two planting dates were used. The first was at the end of the rainy season, and during the growing season of six months the crop received only 250 mm of rainfall. The second planting date was in the middle of the rainy season, and the crop received 828 mm of rainfall during six months growth.

Herbicides

All herbicides were applied pre-emergence by application in water at a rate of 400 l./ha.

Treatment	Doses kg/ha commercial products	Doses kg/ha active ingredient
1. Fluometuron 80%	2.0	1.6
2. Prometrine 50%	2.0	1.0
3. Atrazine 80%	2.0	1.6
4. Difenamid 80%	3.0	2.4
5. Check (no herbicide, no deweeding)		

Experimental design

Randomized blocks were used with three replications at the first and four at the second date of planting. A plot consisted of four rows, 11 m long. The distances between rows was 1.40 m.; spacing in the row was 1.0 m. A single cutting was planted at each hill.

Planting method

25 cm. cuttings were planted at 45° in one side of the row and 10 cm deep. This system was used as it has been shown to favour earliness and high yield.[16, 23]

Herbicide application

The herbicide mixture was applied immediately after planting over the entire plot area, thus wetting both the soil and the cuttings.

Cultural practices

Irrigation was used as considered necessary. Observations were made as follows: number of plants harvested; number and yield of tuberous roots by weight (fresh and dry weights); fresh weight of foliage; number, mean size of the main stem and stem fresh weight; visible damage attributable to herbicides; the weight of weeds produced on both a wet and dry weight basis.

RESULTS AND CONCLUSIONS

The results are presented in Tables 1–8, and from the data presented we conclude that:

1. In large areas of cultivation of cassava, the use of herbicide control of weeds can be recommended.
2. The best product tested was fluometuron when applied at doses of 2 kg/ha (80% a.i.).
3. Atrazine can be used at a rate of 2 kg/ha (80% a.i.) when conditions are not very wet at the time

of application, but if fluometuron is available there is no advantage in using atrazine.

4. The herbicides prometrine and difenamid, at doses tested did not provide good weed control. However, they did not damage the crop.
5. Cassava yield is very seriously reduced by uncontrolled weed competition.

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TABLE 1

Effect of herbicides* on cassava; yield of roots (fresh and dry weight); number of roots; mean weight of roots.

	Treatment					
	Flumeturon 80% a.i.	Prometrine 50% a.i.	Atrazine 80% a.i.	Difenamid 80% a.i.	Control (no herbicide, no weeding)	l.s.d.5%
Yield roots t/ha (fresh weight)	6.30	2.07	4.87	1.78	0.66	3.28
t/ha (dry weight)	1.86	0.62	1.70	0.47	0.19	1.27
Number of roots/ha.	65,802	57,261	73,376	32,142	20,455	44,113

* Herbicides were applied at the end of the wet season.

TABLE 2

Effect of herbicides* on cassava. Fresh weight of aerial parts (stems + leaves); fresh weight of leaves (blades + petioles); fresh weight of blades. Leaf area and leaf area index.

	Treatment					
	Flumeturon 80% a.i.	Prometrine 50% a.i.	Atrazine 80% a.i.	Difenamid 80% a.i.	Control	l.s.d.5%
Aerial part t/ha(fresh)	11.65	4.32	10.40	4.00	2.10	4.86
Leaves t/ha(fresh)	5.13	1.71	4.77	1.66	o.84	2.13
Blades t/ha(fresh)	3.69	1.09	2.93	1.10	0.52	1.36
Leaf area m^2/ha	21,688	6,828	21,748	6,783	2,298	11,722
Leaf area index	2.17	0.68	2.17	0.67	0.23	1.17

* Herbicides applied at the end of the wet season

TABLE 3

Effect of herbicides* on cassava and weeds. Weight of weeds (fresh and dry weights); yield of roots (dry weight); ratio of dry weight of roots to dry weight of weeds.

	Treatment					
	Flumeturon 80% a.i.	Prometrine 50% a.i.	Atrazine 80% a.i.	Difenamid 80% a.i.	Control (no herbicide, no weeding)	l.s.d.5%
Weeds t/ha (fresh wt)	5.68	6.11	4.05	8.77	8.33	4.39
Weeds t/ha (dry wt)	1.24	0.30	0.83	2.74	1.89	1.11
Roots t/ha (dry wt)	1.86	0.62	1.70	0.47	0.19	1.27
Ratio dry wt. roots:dry wt. weeds	1.5	0.48	2.05	0.17	0.10	-

* herbicides were applied at the end of the wet season

TABLE 4

Effect of herbicides* on the number of cassava plants harvested; the number of main stems per hectare, and the rate of number of stems/plant.

	Treatment					
	Flumeturon 80% a.i.	Prometrine 50% a.i.	Atrazine 80% a.i.	Difenamid 80% a.i.	Control (no herbicide, no weeding)	l.s.d.5%
No. plants harvested/ha.	6,925	5,951	6,386	6,383	6,295	1.948
No.main stems/ha.	43,505	25,756	30,408	20,778	17,856	14,903
Number of stems/plant	6.28	4.33	4.76	3.25	2.85	-

* herbicides applied at the end of the wet season

TABLE 5

Effect of herbicides* on the yield of cassava roots (fresh and dry weights); the number of roots and the mean weight of roots.

	Treatment					
	Flumeturon 80% a.i.	Prometrine 50% a.i.	Atrazine 80% a.i.	Difenamid 80% a.i.	Control (no herbicide, no weeding)	l.s.d.5%
Yield roots t/ha (fresh weight)	6.25	1.55	1.36	0.75	0.39	1.90
t/ha (dry weight)	2.00	0.53	0.42	0.24	0.11	0.65
Number of roots/ha.	54,383	23,116	20,941	15,422	8,603	17,110

* herbicides applied in the middle of the wet season

TABLE 6

Effect of herbicides* on cassava. Fresh weight of aerial parts (stems + leaves); fresh weight of leaves (blades + petioles); fresh weight of blades. Leaf area and leaf area index.

	Treatment					
	Flumeturon 80% a.i.	Prometrine 50% a.i.	Atrazine 80% a.i.	Difenamid 80% a.i.	Control (no herbicide, no weeding)	l.s.d.5%
Aerial part t/ha(fresh)	8.19	3.29	2.17	1.37	1.08	2.80
Leaves t/ha(fresh)	3.07	1.03	0.79	0.30	0.32	1.19
Blades t/ha(fresh)	1.81	0.53	0.63	0.20	0.16	0.77
Leaf area m^2/ha.	12,188	1,892	2,924	706	581	7,390
Leaf area index	1.21	0.19	0.29	0.07	0.06	0.73

* herbicide applied in the middle of the wet season

TABLE 7

Effect of herbicides* on cassava and weeds. Weight of weeds (fresh and dry weights). Yield of roots (dry wt.); ratio of dry weight of roots to dry weight of weeds.

	Treatment					
	Flumeturon 80% a.i.	Prometrine 50% a.i.	Atrazine 80% a.i.	Difenamid 80% a.i.	Control (no herbicide, no weeding)	l.s.d.5%
Weeds t/ha (fresh wt)	2.84	7.84	3.70	6.74	8.94	4.07
Weeds t/ha (dry wt)	2.05	5.76	2.49	4.98	6.82	2.51
Roots t/ha (dry wt)	2.00	0.53	0.42	0.24	0.11	0.65
Ratio dry wt. roots:dry wt. weeds	0.96	0.09	0.17	0.05	0.02	-

* herbicides applied in the middle of the wet season

TABLE 8

Effect of herbicides* on the number of cassava plants harvested; the number of main stems per hectare, and the rate of number of stems/plant.

	Treatment					
	Flumeturon 80% a.i.	Prometrine 50% a.i.	Atrazine 80% a.i.	Difenamid 80% a.i.	Control (no herbcide, no weeding)	l.s.d.5%
No.plants harvested/ ha.	6,818	6,575	4,870	5,925	6,736	1,364
No. main stems/ha.	43,911	21,834	15,740	13,879	10,389	19,924
Number of stems/plant	6.44	3.32	3.15	2.34	1.54	

* herbicides applied in the middle of the wet season