

HERBICIDAL CONTROL OF WEEDS IN PINEAPPLE VARIETY 'KEW'

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The cost of production of pineapple in India is high compared to some of the major pineapple growing countries of the world. One of the factors contributing to the high cost of production is the expenditure towards weed control. The heavy rainfall conditions existing in Kerala is very conducive for the quick and vigorous growth of a wide spectrum of noxious weeds which if left unchecked, completely smother the crop. Removal of weeds by manual labour is the established practice and this has become expensive due to high cost of labour. It is therefore, imperative to adopt cheaper methods to keep the weeds under control and in this context the herbicidal control of weeds is gaining importance. Dhuria and Leela (1970, 1971) reported the efficacy of CP 44939, bromacil and diuron in checking the weed growth in pineapple gardens in Karnataka State. There is no reported work of the effect of herbicides in pineapple from Kerala, eventhough, it is one of the major pineapple growing states in the country. The trial, the results of which are reported in this paper, was carried out at the Pineapple Research Centre, Kerala Agricultural University Main Campus, Vellanikkara in the years 1974-76 with the objectives of finding out the best herbicide capable of suppressing a broad spectrum of weeds and their economics in pineapple under the soil and climatic conditions of Kerala. About 42 types of weeds have been recorded in the pineapple plantations of Kerala, among which, the dicots *Eupatorium*, *Mimosa pudica*, *Phyllanthus niruri*, *Ageratum conyzoides*, *Curculigo orchoidis*, *Emelia sanchifolia*, *Echnocarpusfruticence* and the monocots *Cynodondactylon*, *Panicum Intereptus* and *Ecomodium trifolium* are more widely prevalent.

Materials and Methods

Diuron (3, 4—dichlorophenyle — 1 — 1 — dimethyl urea) and Bromacil (5 Bromo — 3 — sec Butyl — 6 methyl uracil) both at 1.5, 2.2, 2.5 and 3.0 kg per hectare individually and in combinations of diuron and bromacil at 1.5 kg + 1.5 kg, 1.5 kg + 2.0 kg, 2.0 kg + 1.5 kg and 2.0 kg + 2.0 kg per hectare respectively were the treatments tried along with hand weeded and unweeded controls. The soil of the experimental plot was typical lateritic loam with good drainage. The lay out was randomised block design with three replications with a plot size of 15.75 sq. metre accomodating 70 plants with spacing 30 cm between plants x 60 cm between rows x 90 cm between trenches. Uniform suckers possessing 15—18 leaves were planted and they were fertilized with 16 g. N and 12 g. K₂O per plant in two equal doses at the time of planting and three

months after planting and 4 g. P₂O₅ in single dose at the time of planting. The herbicides were applied as pre-emergent sprays one month after planting using 600 litres of water per hectare. A second spraying was given six months after the first application using half the dose. In the hand weeded control plot, hand weeding was done three times. In the second year, only one post emergent herbicide application was done using full dose. To induce uniform flowering in plants, ethrel at 1000 ppm. was applied on 24-10-1975 when the plants were about 16½ months old.

The observations recorded were: dry weight of weeds per square metre at different intervals, number of leaves produced and leaf area of 'D' leaf under different treatments at the time of application of growth regulator, extent of flowering in different treatments due to growth regulator application, yield and quality of fruits and economics of some best treatments compared to hand weeded and unweeded control plots.

Table 1

Dry weight of weeds per square metre area

Treatment		Mean dry weight of weeds (gms) per square metre area at intervals of					
		First year (1974-75)			Second year (1975-76)		
		2 months	5 months	8 months	4 months	6 months	6 months
Diuron	1.5 kg/Ha	44.60	116.67	140.95	9.993	123.33	32.70
	2.0 "	17.33	83.33	39.87	8.723	56.67	46.30
	2.5 "	14.97	66.67	112.70	4.467	28.33	46.70
	3.0 "	3.23	56.50	25.60	3.933	20.33	27.70
Bromacil	1.5 "	63.90	250.00	137.23	26.841	83.00	133.70
	2.0 "	28.20	134.33	138.15	30.000	99.17	152.70
	2.5 "	10.00	82.33	54.60	21.007	31.33	87.00
	3.0 "	14.33	83.33	70.23	4.550	26.67	48.70
Diuron 1.5 kg + bromacil	1.5 kg/Ha	12.60	85.33	84.30	3.875	71.83	70.00
	1.5 kg + ,, 2.0 ,,	11.87	150.00	60.77	3.057	12.50	64.70
	2.0 kg + ,, 1.5 ,,	13.37	133.33	47.70	5.983	32.23	94.00
	2.0 kg + ,, 2.0 ,,	14.03	134.35	63.55	2.303	34.33	149.30
	Hand weeded control	225.77	66.67	28.80	15.233	138.33	28.70
Unweeded control	208.87	283.33	254.60	210.367	372.67	453.70	
Significance		**	*	*	**	*#	*#
D.		88.95	126.44	116.58	91.49	147.00	157.60

Results and Discussion

The observation on mean dry weight of weeds in g per square metre area recorded at different intervals are presented in Table 1. It can be seen from the table that there was reduction in weed growth in all the plots sprayed with herbicides compared to control, two months after the first pre-emergence spraying. Eventhough, there was an increase in dry weight of weeds at 5 months in all the treatments, further increase was checked by the second post emergence spraying. In the second year also, there was a general reduction in weed growth in all plots sprayed with herbicides. Among the various treatments, diuron 3 kg per hectare was found to be most effective and significantly superior in both the years.

The data on mean number of leaves per plant and calculated leaf area in sq. cm are furnished in Table 2. In respect of leaf production and leaf area,

Table 2
Leaf production and leaf area at flowering and extent of flowering due to growth regulator application

Treatment		Mean number of leaves/plant	Leaf area in sq. cm.	Percentage of flowering
Diuron	1.5 kg/Ha.	37.93	285.13	90.00
"	2.0	27.91	287.27	91.43
"	2.5	37.87	283.14	97.61
"	3.0	28.22	292.32	97.13
Bromacil	1.5	34.22	254.52	94.76
"	2.0 "	31.31	273.15	89.05
"	2.5 "	33.66	248.77	89.05
"	3.0	35.84	261.03	100.00
Diuron	1.5 kg Bromacil 1.5 kg/Ha	33.68	261.03	96.19
"	1.5 kg † " 2.0 "	35.53	287.54	95.17
"	2.0 kg † " 1.5 "	36.02	300.29	95.17
	2.0 kg † " 2.0 "	38.88	298.98	90.95
Hand weeded control		37.88	289.84	94.29
Unweeded control		28.20	239.26	75.24

the data are again in general favourable to diuron 3 kg per hectare ~~on~~entthough, this treatment is only second best to the combination treatment of diuron + bromacil each at 2 kg per hectare. The treatment 'hand weeding' is also superior in this respect whereas the treatment 'unweeded control' is inferiormost.

Table 2 shows that good flowering of 89 to 100 per cent could be obtained by the application of growth regulator. The variation between different herbicide treatments and hand weeded control is not much. However, the treatment 'unweeded control' has recorded the minimum extent of flowering.

The mean plot yields of the plant crop and the data on analysis on samples of fruits for T. S. S and acidity are furnished in Table 3. The data show that differences in yield due to treatments are significant and all herbicide treatments and hand weeded control are superior to 'unweeded control'. Among the various herbicide treatments, diuron 3 kg per hectare has accounted for the maximum yield. The quality of the fruits has not been impaired by the herbicide application as is evident from the data recorded on T. S. S. and acidity of fruits. There is no appreciable difference either in T. S. S. or in acidity of fruits of different treatments including those of control plots.

Table 3
Mean plot yield in kg and analysis data of fruits

Treatment	Mean plot yield in kg (with crown)	Mean T. S. S. percentage	Mean acidity percentage
Diuron 15 kg/Ha.	85.68	16.25	0.224
„ 2.0	90.07	16.75	0.272
„ 2.5 „	84.98	15.75	0.341
„ 3.0	92.42	15.75	0.400
Bromacil 15	83.25	14.00	0.459
„ 2.0	72.24	13.25	0.459
„ 2.5 „	76.53	14.00	0.285
„ 3.0	79.66	14.75	0.384
Diuron 15 kg + Bromacil 15 kg/Ha.	79.91	15.00	0.224
„ 1.5 kg + „ 2.0 „	89.65	13.50	0.256
„ 2.0 kg + „ 1.5 „	85.89	15.00	0.336
„ 2.0 kg + „ 2.0 „	86.82	15.00	0.368
Hand weeded control	80.57	13.50	0.368
Unweeded control	50.82	14.75	0.355
Significance	**		
C. D	13.28		

The calculated data showing the economics of some of the best herbicide treatments comparing with hand weeding and unweeded controls are presented in Table 4. It is evident from the data that under the existing cost of herbicides application of herbicides like diuron is cheaper than hand weeding as a minimum of three hand weedings are necessary to keep the pineapple plots reasonably free from weeds. Further, due to higher yield of fruits obtained, the profit accruing from diuron treatment is also much higher than all other treatments and controls.

Table 4

Economics of chemical weed control in pineapple

Good treatments among different dosages and kinds of herbicides	Calculated yield in tons per ha.	Increase in yield in tons per ha. due to treatments	Gain in terms of money	Additional expenditure for the treatment per ha.	Profit per hectare
			Rs	Rs	Rs
Diuron 3 kg/Ha	58.69	26.42	13,210	1,833	11,377
Diuron 1.5 kg †					
Bromacil 2.0 kg/Ha	56.83	24.56	12,280	2,568	9,712
Hand weeding	51.16	18.89	9,445	3,000	6,445
Unweeded control	32.27		..		

1. Rate of produce calculated at Rs. 500 per ton of fruits 2. Cost of herbicides (i) **Karmex** (Diuron 80% a. i. e.) Rs. 104 per kg (ii) **Hylar X** (Bromacil 80% a. i. e.) Rs. 200 per kg.

The herbicides diuron and bromacil were found effective in controlling a broad spectrum of monocot and dicot weeds. Among the different dosages, diuron 3 kg per hectare was found to be more effective in reducing the number and dry weight of weeds especially in initial stages. No correlation exists between the dry weight and number of weeds per square metre area. Therefore, the number of weeds in a plot need not necessarily represent the intensity of weed growth. The pineapple crop requires atleast three manual weedings annually to keep the plots reasonably free from weeds. By using the herbicides, diuron and bromacil, the expenditure can be brought down considerably. Diuron 3 kg per hectare is cheaper and more effective. The response of plants to growth regulator improved considerably under weed free conditions. There was also perceptible yield increase in diuron treated plot contributing for better income. The herbicides do not either alter the quality of fruits or cause damage to crop. Under the conditions existing in Trichur, diuron 3 kg per hectare appears as a safe and economic herbicide that can be recommended for pineapple plantations.

Summary

A herbicidal trial on pineapple variety 'Kew' was undertaken at the Pineapple Research Centre, Kerala Agricultural University Vellanikkara during the years 1974-76 to test the efficacy of diuron and bromacil at different doses. The herbicides in general effectively controlled a broad spectrum of weeds. Among different dosages tried, diuron 3 kg per hectare was more effective and the treatment gave significantly increased yield without producing any harmful effects to fruit quality. From the point of economics also, diuron 3 kg per hectare was more economical.

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സംഗ്രഹം

കൃത്യ ഇനം കൈച്ചെടുകൾ ഉപയോഗിക്കാവുന്ന കളനശീകരണ രാസവസ്തുക്കൾ ഏതൊക്കെയാണെന്നു കണ്ടു പിടിക്കുന്നതിനുവേണ്ടിയുള്ള ഒരു പരീക്ഷണം കേരള കാർഷിക സർവ്വകലാശാലയുടെ ആസ്ഥാനമായ വെള്ളാനിക്കരയിൽ 1974-76-ാം ആണ്ടുകളിൽ നടത്തുകയുണ്ടായി. കളകൾ മുളയ്ക്കും മുമ്പ് ഡയൂറോൺ, ബ്രൊമാസിൽ എന്നീ കള നാശിനികൾ വ്യത്യസ്ത അളവിൽ പരീക്ഷണ വിധേയമാക്കി. ഏകപത്രികളും, ദ്വിപത്രികളും ആയ ഒട്ടേറെ കളകളെ നശിപ്പിക്കുവാൻ ഈ കള നാശിനികൾ പൊതുവെ ഉപയോഗപ്രദമാണെന്നു ഈ പരീക്ഷണം തെളിയിച്ചു. ഡയൂറോൺ $CTn_{20}SO_{10}TO^{\circ}$ 3 കി. ഗ്രാം തോതിലും, ബ്രൊമാസിൽ 2.5 കി. ഗ്രാം തോതിലുമാണു് ഏറ്റവും ഫലപ്രദമായി കണ്ടതു്. പക്ഷെ, ചിലവുകൂടി കണക്കിലെടുക്കുമ്പോൾ ഹെക്ടറിനു് ³ കി. ഗ്രാം എന്ന തോതിൽ ഡയൂറോൺ സ്പ്രെച്ചെയ്യുകയും, തുടർന്നു് 5-6 മാസത്തിനു ശേഷം അതിന്റെ പകുതി മാത്രയിൽ ഒരിക്കൽകൂടി ആവർത്തിക്കുകയും ചെയ്യുന്നതു് ഏറ്റവും ലാഭകരമാണെന്നു കണ്ടു. കളനാശിനി ഉപയോഗം പഴുത്തിന്റെ ഗുണഗണങ്ങളെ ബാധിക്കുന്നില്ല എന്നതിനു പുറമെ, കൂടുതൽ വിളവു് ലഭ്യമാകുവാൻ സഹായകമായി ഭവിക്കുന്നതായും കണ്ടു.

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