

**V**olunteer oil palm seedlings (VOPs) are becoming a serious weed problem in oil palm plantations, especially in newly replanted and mature areas. Uncontrolled VOPs will hinder field operations such as harvesting, collection of fresh fruit bunches (FFB) and fertilizer application. This article reports on use of glyphosate monoammonium and other herbicides for controlling VOPs.

## GLYPHOSATE MONOAMMONIUM

Glyphosate monoammonium (ammonium *N*-[(hydroxyphosphinato) methyl] glycine) is a glyphosate derivative (Figure 1).

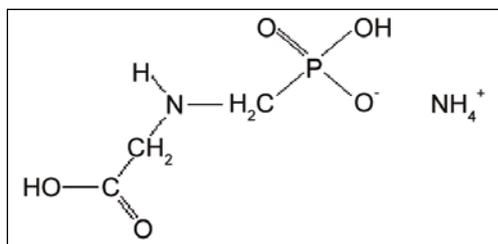


Figure 1. Glyphosate monoammonium.

Its herbicidal action is by inhibiting amino acid (aromatic) metabolism in plants. It is a non-selective, post-emergence translocated herbicide effective against both annual and perennial grasses and certain broadleaf weeds.

## EFFICACY OF GLYPHOSATE MONOAMMONIUM AND OTHER HERBICIDES

This study was conducted in a plantation at Bangi, Selangor, under mature oil palm (19 years old). Several plots with plenty of VOPs were marked out. Thirty VOPs of three to five months old, measuring 15 - 25 cm from ground to leaf tip, were randomly selected in each plot. Each seedling was numbered with a waterproof tag (Figure 2a).

Twelve treatments were applied – 11 commercial herbicides with potential efficacy against VOPs and a control (Table 1). All the herbicides were applied at high volume general weed control (GWC) spraying of 450 litre ha<sup>-1</sup> using a knapsack sprayer fitted with a brown hollow cone nozzle tip. Foliar symptoms of yellowing, browning and drying up as seen in Figures 2b to 2d were recorded. Scorching of the leaves occurred one day after application (DAA) with paraquat dichloride and MSMA (monosodium methylarsonate). VOPs treated with the other herbicides remained green.



Figure 2a. Untreated VOPs (as control).



Figure 2b. Yellowing (←---) and browning (←) foliar symptoms.



Figure 2c. Brown foliar symptom.



Figure 2d. Dead VOPs.

**TABLE 1. EFFICACY OF GLYPHOSATE MONOAMMONIUM AND OTHER HERBICIDES AGAINST VOPs**

Treatment	Product rate (ha <sup>-1</sup> )	(% of VOPs killed <sup>##</sup> )			
		7 DAA <sup>##</sup>	14 DAA	28 DAA	56 DAA
2,4-D isopropylamine 45% w/w	2.5 litre	0	10f	17g	67c
Diuron 80% w/w	1.0 kg	0	0	3h	3e
Glufosinate ammonium 13.5% w/w	3.3 litre	0	40d	67d	67c
Glufosinate ammonium 5.8% w/w + imazapyr isopropylamine 5.5% w/w + 2,4-D dimethylamine 4.2% w/w	1.2 litre	0	0	0	3e
Glyphosate dimethylamine 52% w/w	3.0 litre	0	0	27fg	33d
Glyphosate isopropylamine 41% w/w	4.0 litre	0	70c	87c	87b
Glyphosate isopropylamine 34% w/w + MCPA isopropylamine 6.5% w/w	3.0 litre	0	3g	33ef	47d
Glyphosate monoammonium 52% w/w	5.0 litre	0	100a	100a	100a
Imazapyr isopropylamine 11.9% w/w	2.5 litre	0	0	0	0
MSMA 35.5% w/w	5.0 litre	20b	27e	40e	43d
Paraquat dichloride 13% w/w	5.0 litre	93a	93b	93b	93b
Untreated (control)	-	0	0	0	0

Notes: <sup>#</sup>Means with the same letter in the same column are not significantly different at  $p = 0.05$ .

<sup>##</sup>DAA = days after application.

At 3 DAA, no VOPs had been killed by any treatment. But at 7 DAA, paraquat dichloride (93% kill) and MSMA (20% kill) were significantly more effective than the other herbicides (Table 1). At 14 DAA, there was 100% kill by glyphosate monoammonium, followed by paraquat dichloride (93%, the same as at 7 DAA) and glyphosate isopropylamine (70%). The others gave <50% kill or none at all (Table 1). At 56 DAA, all the herbicides gave >50% kill except for glyphosate isopropylamine + MCPA mixture (47%), MSMA (43%) and glyphosate dimethylamine (33%),

and three others which were totally ineffective. Regrowth of treated VOPs (Figure 3) were observed for all herbicides except for glyphosate monoammonium (Table 2).

#### **COST COMPARISON OF USING DIFFERENT HERBICIDES**

The estimated costs for using the herbicides are presented in Table 3. Paraquat dichloride (Capayam<sup>®</sup>) is the cheapest. Glyphosate monoammonium (Ammono Supre<sup>®</sup>) is much more expensive but gives excellent control.



Figure 3. Regrowth of treated VOPs.

TABLE 2. REGROWTH OF TREATED VOPs AT 70 DAYS AFTER APPLICATION.

Treatment	Regrowth of treated VOPs (%) <sup>#</sup>
2,4-D isopropylamine	23g
Diuron	97b
Glufosinate ammonium	33f
Glufosinate ammonium + imazapyr isopropylamine + 2,4-D dimethylamine	97b
Glyphosate dimethylamine	60c
Glyphosate isopropylamine	13h
Glyphosate isopropylamine + MCPA isopropylamine	47e
Glyphosate monoammonium	0
Imazapyr isopropylamine	100a
MSMA	57d
Paraquat dichloride	7i

Note: <sup>#</sup>Means with the same letter in the same column are not significantly different at  $p = 0.05$ .

## CONCLUSION

Glyphosate monoammonium was the most effective herbicide against VOPs followed by paraquat dichloride and glyphosate isopropylamine. VOPs treated with glyphosate monoammonium were completely killed within 14 days. However, greater care must be taken with using the chemical in young palms, especially those below two years old, as the crop and weed are

then not very different, and both very susceptible to the herbicide (Tan and Chan, 1994). Even though the other herbicides had poorer control of VOPs in this trial, using different volumes for the spraying might have given different results. Some herbicides act better with low volume (LV) or ultra low volume (ULV) spraying. Therefore, different volume spraying should be tested together with different rates of application, and different surfactants or adjuvants to increase the efficacy of the herbicides.

TABLE 3. ESTIMATED COSTS FOR USING DIFFERENT HERBICIDES AGAINST VOPs

Herbicide	Product rate (ha <sup>-1</sup> )	Price per 20 litres <sup>#</sup> (RM)	Cost (RM)	
			15L pump	GWC <sup>##</sup> spray (ha <sup>-1</sup> )
2, 4 isopropylamine – Keris <sup>®</sup>	2.5 litre	200.00	0.83	24.90
Diuron – Ancom Diuron 80 <sup>®</sup>	1.0 kg	37.50 kg <sup>-1</sup>	1.25	37.50
Glufosinate ammonium – Basta 15 <sup>®</sup>	3.3 litre	640	3.52	105.60
Glufosinate ammonium + imazapyr isopropylamine + 2,4-D dimethylamine – Libero <sup>®</sup>	1.2 litre	1 100	2.20	66.00
Glyphosate dimethylamine – Q-weapon <sup>®</sup>	3.0 litre	260	1.30	39.00
Glyphosate isopropylamine – Weed Hoe <sup>®</sup>	4.0 litre	245	1.63	48.88
Glyphosate isopropylamine+ MSMA – Rapid <sup>®</sup>	3.0 litre	348	1.74	52.20
Glyphosate monoammonium – Ammo Supre <sup>®</sup>	5.0 litre	230	1.92	57.62
Imazapyr isopropylamine – Assault 100A <sup>®</sup>	2.5 litre	800	3.32	99.60
MSMA – Ansar 550 <sup>®</sup>	5.0 litre	230	1.92	57.62
Paraquat dichloride – Capayam <sup>®</sup>	5.0 litre	130	1.09	32.57

Notes: <sup>#</sup>End user prices of herbicides (per 20-litre except where indicated) in May 2007. Calculations were based on 450 litre ha<sup>-1</sup> spray volume.

<sup>##</sup>GWC = general weed control spray volume at 450 litre ha<sup>-1</sup>.

## REFERENCE

TAN, C H and CHAN, C L (1994). Injury symptoms on young oil palms induced by topical and basal application of herbicides. *The Planter*, 70 (821): 341-358.

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