Utilisation of Herbicide Reductant to Improve Weed Control in Oil Palm Plantations

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ABSTRACT

A well-considered weed management strategy has to strike a balance in terms of crop and weed competition, crop injury, efficient cost of control measures, impact on the environment, and the need to reduce soil erosion, especially in the tropics with high and intense rainfall. Furthermore, weeds must be managed efficiently with an acceptable cost to ensure crop profitability. Therefore, FGV has conducted a series of studies on Weed Solut-ion (2-sodium amine or 2-SA), a novelty herbicide reductant product to be mixed with any herbicide and claimed to reduce its effective herbicide dosage by up to 50-70%. The 2-SA is categorized as inorganic salts adjuvant, with additives that aim to improve the efficiency of herbicides. A series of experiments was conducted in immature and mature oil palm at Ladang FGV Agri Services, Jerantut, Pahang to verify the claims. Addition of 2-SA herbicide reductant successfully reduced chemical herbicide dosage by 50% for circle weeding in immature oil palm, and by 70% for inter row weeding (broad leaves) and selective weed control of Clidemia hirta. In mature palms, the reduced herbicide doses with 2-SA gave similar weed control efficacy with the standard practice (100% herbicide only). Cost savings of overall herbicides used per ha per round of 14 to 25% were achieved compared to the standard treatments without 2-SA. Moreover, 2-SA did not show any phytotoxic effect on oil palm at 6 weeks after spraying at 0.5, 1.0, and 1.5 L/ha of the mixtures. These findings attest to the cost effectiveness and product safety of 2-SA towards effective weed management and improve sustainability of oil palm plantations.

INTRODUCTION

Herbicides is widely used in oil palm plantations. Almost 25% of the cost of the estate involves the cost of weeding. The consumption of herbicide increases annually, this indirectly increases the cost of weeding on oil palm plantations. Hence, the use of more effective and more cost-effective herbicide types is the preferred choice of estates so as to reduce the cost of weeding on FGV estate. Weeding activities not only involve weed control in circle palm, woodies control is also the main weeding activity in oil palm plantations in immature and mature areas.

METHODOLOGY

- Pusat Penyelidikan Pertanian Tun Razak (Fig. 1)
 - **Parameter:**
 - Percentage of weed efficacy
 - Visual observation
 - Cost efficiency (Table 4)
 - Phytotoxic test (Fig. 2)



Table 2 : Effects of 2-sodium	amine	in	the	reduction	of	weed
growth at immature circle						

RESULT & DISCUSSION

Troatmont			% Weed Control (WAA)							
	rreatment		2	3	4	5	6			
T1	(Untreated Control)	Of	0b	0b	Of	Of	0e			
T2	GA @3.3L/ha + Adjuvant@25ml/Ha	94a	100a	100a	(1e)	(11e)	(20d)			
Т3	GA @1.65L/ha + WS @1.65L/ha + Adjuvant@25ml/Ha	91c	100a	100a	(4c)	(15c)	(24b)			
T4	GA @2.30L/ha + WS @0.99L/ha + Adjuvant@25ml/Ha	92b	100a	100a	(2d)	(13d)	(22c)			
T5	GA @1.65L/ha + WS @0.99L/ha + Adjuvant@25ml/Ha	90d	100a	100a	(5b)	(17b)	(25a)			
Т6	GA @0.99L/ha + WS @0.99L/ha + Adjuvant@25ml/Ha	89e	100a	100a	(7a)	(18a)	(25a)			



Т3

- GA 50% + Weed Solut-ion 50% + Adjuvant 100% (T3) is comparable with label recommendation (T2) (Fig. 4).
- Reduce weeding cost by 25%.
- Weed Solut-ion can reduce herbicide residue on oil palm (Guntoro et al., 2016).

Fig. 4 : Weed Efficacy by using 50% herbicide + 50% WS + Adjuvant

Table 3 : Effects of 2-sodium amine in the reduction of selective woodies

	% Weed Control (WAA)						
	Treatment	1	2	4	8	12	
T1	Untreated Control	0d	Of	0b	0b	0b	
T2	Triclopyr @1.5L/ha + Adjuvant@25ml/Ha	33a	90a	100a	100a	100a	
Т3	Triclopyr @0.75L/ha + WS @0.75L/ha + Adjuvant@25ml/Ha	30b	86b	100a	100a	100a	
T4	Triclopyr @0.75L/ha + WS @0.45L/ha + Adjuvant@25ml/Ha	30b	84c	100a	100a	100a	
	Triplopur @0.451/bo + WS @0.751/bo +						





Ladang PPPTR, Jerantut, Pahang

Field

Evaluation



Control

1.5 L/Ha Weed Solut-ion

Fig. 2 : Phytotoxic effect by using Weed Solut-ion

at 1.5 L/Ha 2-sodium amine

Τ5	Adjuvant@25ml/Ha	26c	82d	100a	100a	100a	Fig. 5 : Weed Efficacy by usin
Т6	Triclopyr @0.45L/ha + WS @0.45L/ha + Adjuvant@25ml/Ha	25c	81e	100a	100a	100a	30% herbicide + 30% WS Adjuvant

Triclopyr 30% + WS 30% + Adjuvant 100% (T6) is comparable with label recommendation (T2) (Fig. 5).

Reduce weeding cost by 14%. Weed Solut-ion allegedly reduces herbicide dosage at the same time enhances its performance (Putri et al., 2018).

Table 4 : Cost analysis for the use of 2-sodium amine

Stage	Target	rget Spraying (RM/ha/year) Cost of weeding for FGV Group (RM/year)		Cost saving				
		Round/rear	STD	with WS	STD	with WS	RM/year	%
lan an atura	Circle (1 st year)	12	1106	834	3,318,570	2,501,820	816,750	25
Immature	Circle (2 nd year)	8	737	556	2,212,380	1,667,880	544,500	25
Mature	Palm circle and interrows	3	153	131	35,744,076	30,678,304	5,065,772	14
	Woodies	3	133	114	30,947,964	26,598,369	4,349,595	14
Total				72,222,990 61,446,373		10,776,617	15	

Price of herbicides and Weed Solut-ion as in FGV's Price List, 2023.

* Estimated total area: 303,000 hectares; Coverage area: 25%.

CONCLUSION

Weed Solut-ion is able to reduce chemical herbicide by 50% for weeding at immature palm circle, meanwhile it able to reduce 70% of herbicide dosage for weeding at mature palms area including for palm circle, inter row and selective woodies with total cost saving at 15%. Besides, it offers a new approach to promoting the sustainability of oil palm cultivation.

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RESULT & DISCUSSION

Table 1: Effects of 2-sodium amine in the reduction of weed growth at mature circle

	Tractment	% Weed Control (WAA)						
	ricalinent		2	4	8	12		
T1	(Untreated Control)	0d	0b	0b	0b	0b		
T2	Gly @2L/ha + MSM@75g/ha Adjuvant@25ml/Ha	86a	100a	100a	100a	100a		
Т3	Gly @1L/ha + MSM@75g/ha + WS @1L/ha + Adjuvant@25ml/Ha	84bc	100a	100a	100a	100a		
T4	Gly @1.5L/ha + MSM@37.5g/ha + WS @1L/ha + Adjuvant@25ml/Ha	85ab	100a	100a	100a	100a		
T5	Gly @1L/ha + MSM@37.5g/ha + WS @1L/ha + Adjuvant@25ml/Ha	83c	100a	100a	100a	100a		
Т6	Gly @1.4L/ha + MSM@75g/ha + WS @0.6L/ha + Adjuvant@25ml/Ha	86a	100a	100a	100a	100a		
T7	Gly @1.0L/ha + MSM@37.5g/ha + WS @0.6L/ha + Adjuvant@25ml/Ha	84bc	100a	100a	100a	100a		
Т8	Gly @0.6L/ha + MSM@37.5g/ha + WS @1L/ha + Adjuvant@25ml/Ha	83c	100a	100a	100a	100a		
Т9	Gly @0.6L/ha + MSM@22.5g/ha + WS @0.6L/ha + Adjuvant@25ml/Ha	83c	100a	100a	100a	100a		

- Glyphosate 30% + MSM 30% + Weed Solut-ion 30% + Adjuvant 100% (T9) is comparable with full rate (T2) (Fig. 3).
- Reduce weeding cost by 14%.



T2

(Full rate)

Fig. 3 : Weed Efficacy Between T2 (full rate) and T9 (30% herbicide + 30% WS + Adjuvant)



T9

(WS rate)

Wrotokicity fear

Week After Application (WAA)