

## Effect of adding oil palm-based surfactants to the effectiveness of glyphosate

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### Introduction

The number of oleochemicals used as pesticide surfactant is still limited but the potential is great. This is due to oleochemical being derived from the plants should be more ecological and environmental friendly. Adding surfactant could enhance the penetration of a systemic herbicide and increases efficacy. The non-ionic surfactant is the most common surfactant used with herbicide. The rate and total amount of herbicide uptake depend on the surfactant ethylene oxide (EO) content, concentration and hydrophobe composition, herbicide concentration and plant species. Several derivatives of palm oil have been suggested such as ethoxylates as pesticide surfactant. This study evaluates the influence of adding palm-based oleochemicals on the effectiveness of glyphosate for weed control.

### Materials and Methods

The chemicals were Roundup® (glyphosate isopropylamine 30.5% a.e.) applied at 1.5 kg a.e./ha. Triton X-100 was added to spray solution as an emulsifier. The sprayer used was a conventional manual knapsack sprayer operating at 1 bar and 200 L/ha using a fan nozzle and sprayed 50 cm above the target.

The underground tubers of *C. rotundus* L. collected from Ladang 10B, Universiti Putra Malaysia, Serdang, Selangor were planted a pot (diameter 16 cm & height 13 cm) containing soil of 55% clay, 34% silt and 11% sand. The plants were sprayed at 5-6 leaves stage. The surfactants were palm oil, methyl ester of S1 and S4 (PORIM) and Pulse® (Monsanto). The experimental design was a Completely Randomised Design (CRD) with 10 replications, where 5 of them were for visual assessment and regrowth observation, and the remainder was for the test on spray deposition and chlorophyll content. Spray deposition on the leaf surfaces was determined using fluorescent tracer technique while the chlorophyll content of the leaf was determined by using the Nose Method.

The oleochemical S1 was selected and evaluated further on its performance in comparison with other oleochemicals. Their performances were tested on *Paspalum conjugatum* and *Diodia ocimifolia*. The treatments were applied when *P. conjugatum* and *D. ocimifolia* were at 5–6 weeks after planting and at 4-5 weeks after transplanting respectively. The oleochemicals were Agrimul PG 2067, Agrimul PG 2069 and methyl oleate and they were obtained from Henkel.

### Results and Discussion

The mixture of Roundup® and methyl ester S1 showed similar performance as the standard formulation Roundup® on spray deposition. Adding palm oil, S1, S4 and Pulse to Roundup showed significantly reduction of the chlorophyll content compared to Roundup alone suggesting the rapid uptake and translocation of glyphosate in the presence of these surfactants. However, no significant difference was observed between treatments on the percentage mortality of *C. rotundus* at 15 days after spraying. This showed that most of glyphosate eventually reached the site of action over period of time irrespective of presence or absent of additional surfactants. The similar performance shown by methyl ester S1 in comparison with Pulse® indicates that methyl ester S1 is at par with Pulse®.

The effect of surfactants on the performance of Roundup® against *P. conjugatum* and *D. ocimifolia* showed significantly higher spray deposition of methyl oleate compared with other treatments on both weeds. However, no significant difference was observed on the mortality between treatments except Agrimul PG 2067 showed better control compared with other treatments for the control of *P. conjugatum*.

### Conclusions

Methyl oleate and S1 were found to be a good surfactant in term of increasing the spray deposition on target. This opens the possibility of reducing the dose as a major proportion of active ingredient will be retained on the target. Further studies are required to verify this.

**Benefits from the study**

The study indicated that surfactant could be derived from oleochemical of palm oil. The product is consider to be more environmental friendly that the mineral oil-based surfactant.

**Patent(s), if applicable:**

Nil

**Stage of Commercialization, if applicable:**

Nil

**Project Publications in Refereed Journals:**

Nil

**Project Publications in Conference Proceedings**

1. Omar, D. and Ahmad, A. 1999 Investigation of palm oil and palm-based oleochemicals as adjuvant/surfactant for herbicide. *In Emerging Technologies and Opportunities in the Next Millennium*. Proceedings of 1999 PORIM International Palm Oil Congress - Oleochemicals. Published by PORIM; 6 pp

**Graduate Research**

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<b>Name of Graduate</b>	<b>Research Topic</b>	<b>Field of Expertise</b>	<b>Degree Awarded</b>	<b>Graduation Year</b>
Zahariman Mohd. Shah	Effects of oleochemical surfactant on uptake and translocation of glyphosate from leaf surfaces	Pesticide Application Technology	M.Sc.	2000

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