NOVEL OIL-IN-WATER (EW) GLYPHOSATE-TRICLOPYR HERBICIDES FORMULATION CONTAINING PALM-BASED INERT INGREDIENTS

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608

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Triclopyr (3,5,6-trichloro-2-pyridyloxyacetic acid) is a systemic herbicide to control woody plants and broadleaf weeds. Conventionally, triclopyr is pre-mixed in glyphosate herbicide for maximum weed control. This study was carried out to develop an effective surfactant or mixed surfactants and palm-based solvents in producing *2-in-1* herbicides, oil in water (O/W) glyphosate-triclopyr for better weed control.

From exploratory study on several types of mixed non-ionic surfactants, it was found that 5% (w/w) mixed Disponil OC 25 and DLS2 with HLB 12±1 was the optimum combination of mixed non-ionic surfactants that formed the most stable milky white EW-glyphosate-triclopyr herbicides formulation. A small-scale bioefficacy test on two types of weeds showed that the EW glyphosate-triclopyr herbicides formulation gave better and/or comparable performance to the glyphosate isopropylamine (IPA) that was pre-mixed with conventional triclopyr to control weeds.

PROBLEM STATEMENTS

- Glyphosate IPA formulation could only control grassy and certain broadleaf weeds.
- Solvent-based (EC)-triclopyr is normally added as pre-mixed with glyphosate herbicide to maximise weed control.
- Petroleum-based solvents in EC-conventional herbicides may cause health problems to skin and eyes (*Figure 1*).
- Petroleum-based solvents are less biodegradable, flammable, toxic to aquatic organisms and not environmental-friendly.
- Prices of petroleum-based solvents have increased significantly over the years.

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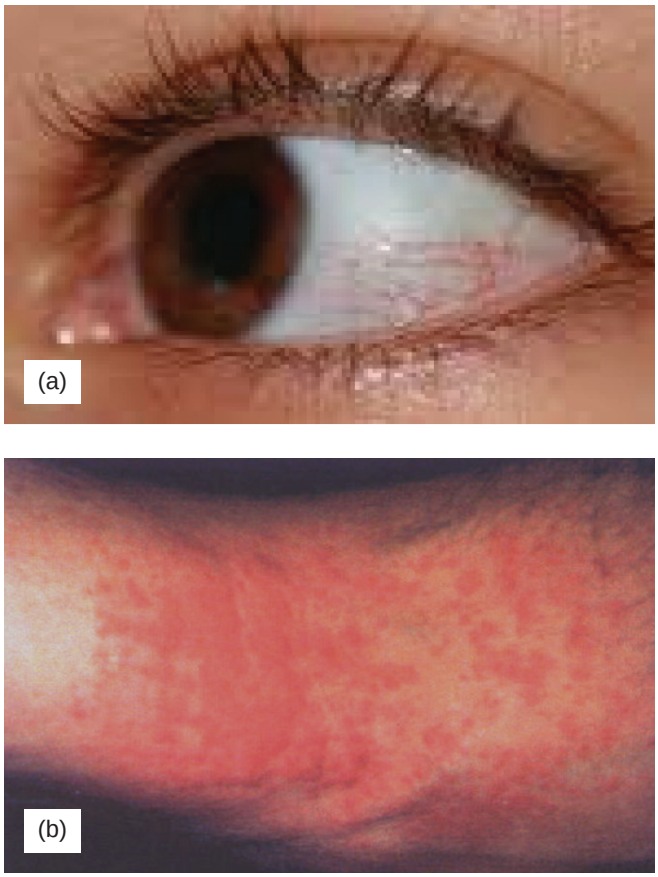

Figure 1. a) Eye and b) skin irritations caused by petroleum-based solvents, such as xylene, kerosene and turpentine.

ADVANTAGES OF PALM-BASED EW-HERBICIDES

- EW-glyphosate-triclopyr herbicides (*Figure 2a*) is a water-based formulation, whereas the conventional emulsifiable concentrate (EC)-formulations contain petroleum-based solvents.
- EW-glyphosate-triclopyr herbicides is expected to cause less medical problems and less phytotoxic to non-targeted plants.
- Can be produced at a lower cost than the conventional EC-glyphosate-triclopyr herbicides.
- Palm-based methyl esters and emulsifiers are green and user-friendly.
- Less toxic to end-users and aquatic organisms.

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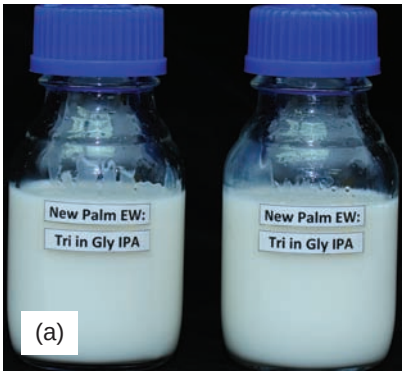

Figure 2. a) Palm-based EW-herbicides, and b) spraying of weeds.

NOVELTY OF TECHNOLOGY

- The oil-in-water (EW) glyphosate-triclopyr herbicide formulation is a *2-in-1* product for better weed control (*Figure 2a*).
- The inert ingredients are formulated using palm/palm kernel oil-based materials, which are renewable, biodegradable and environmental-friendly.
- The inerts are less hazardous to end-users and aquatic organisms.
- An innovative *2-in-1* product of EW glyphosate-triclopyr herbicide formulation using green palm-based materials.

CONCLUSION

The novel palm-based EW glyphosate-triclopyr herbicides formulation had shown comparable or better performance than the glyphosate IPA that was pre-mixed with the conventional EC-triclopyr in controlling weeds (*Figure 3*).

BIOEFFICACY TEST ON WEEDS

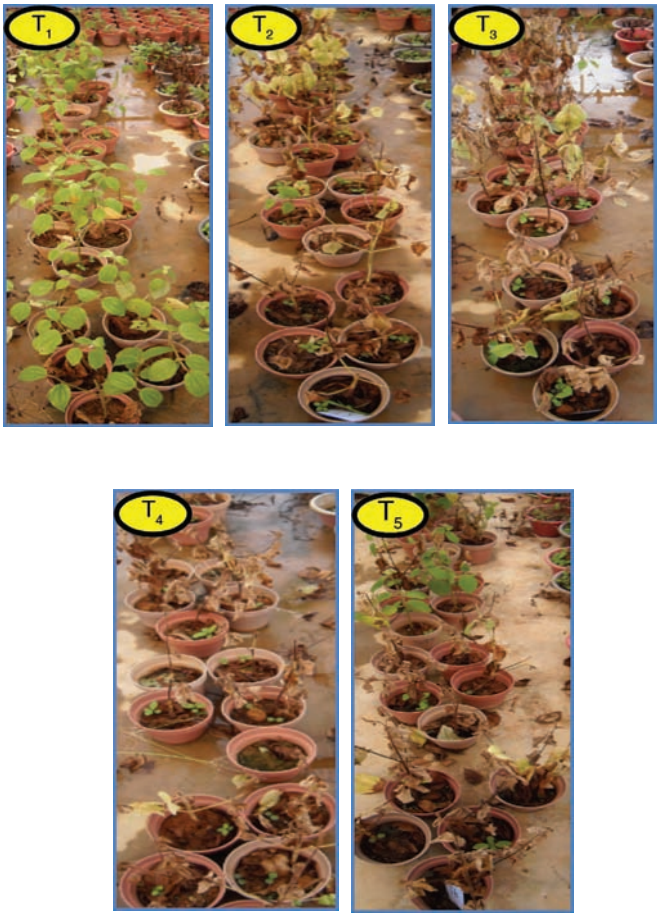

Figure 3. Bioefficacy test using conventional herbicides (T_1, T_2, T_3) and palm EW-herbicides [T_4 and T_5 (½ dose of T_4)] on Clidemia hirta *(woody weed) at 28 days after treatment.*

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