

Possibility of Sophorolipids as Spreader

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1. Aptitude of Sophorolipids as Spreader

- Our **ACS-Sophor®** (Sophorolipids) is made from glucose and Indian natural oil "Madhuca oil" by yeast fermentation. It is the most natural "Surfactant" with no chemical reaction except neutralization.
- Main chemical formula of Sophorolipids is Lacton type which is Nonionic bio-surfactant. It has very low Critical Micelle Concentration and very bulky structure. Hence, physically no way to harm the plants.
- Sophorolipids have features of high bio-degradability and non-environment accumulation activity. Sophorolipids made by yeast are ones of Alkylpolyglucoside and purpose of those are considered to emulsify fatty acids for accelerating membrane permeability, thus Our **ACS-Sophor®** has most fitting composition for this permeability. So, ACS-Sophor® has good and fair possibilities to do the same function against crops and plants.
→ From the above, **ACS-Sophor®** may have idealistic properties as Spreader.

2. Preliminary test of Sophorolipids as Spreader

- Materials
 - ACS-Sophor® (Sophorolipids) : Our product, lot. AMW2H 130418, brown syrup, content approx. 50%
 - Tween20(Polyoxyethrensorbitanmonolaurate) : Wako chemical, clear syrup → commonly used, well known spreader
 - Pure water : Furukawa medicals, [Clean & Clean] → [Adjusted 0.1% conc. each, except pure water](#)
- Plant, tested
 - Silver Dollar Gum → Australia, Tasmania origin(presumption)
 - Long onions / Cabbage → Crops difficult to wet
- Methods
 - a) **Horizontal spread test** : 1drop spotted on the horizontal leaf and observed (see the appendix photo)
 - <Long onions>

Samples	Observations / Results
Photo - 1. Pure water — 0.1%ACS-Sophoro	ACS is wide circle area and easily bleeding than water
Photo - 2. 0.1%Tween20 — 0.1%ACS	ACS is wide circle area and easily bleeding than Tween
Photo - 3. 0.1%ACS — 0.2%ACS	0.2% is wider circle area and easily bleeding than 0.1%
 - <Silver Dollar Gum>

Photo - 4. Pure water — 0.1•0.2%ACS	0.2%ACS is wider circle area and bleeding
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 - <Cabbage>

Photo - 5. Pure water — 0.1•0.2%ACS	Almost same as -4.
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 - b) **Slant spread test** : Long onions, inclination35~40degrees, 40µL spotted and observed
 - Photo - 6. 0.1•0.2%ACS—SLA(Acid type SLs) — Tween20 — Pure water (35degrees)

ACS flow down wetting surface, Tween20 is difficult to flow, pure water remains as spherical
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 - Photo - 7. Done [-6.] at 40degrees

pure water rolling down without wetting surface

3. Surface tension measurement of each materials by capillary type surface tension meter

Materials	Concentration (%)	Surface tension (mN/m)
Pure water	—	74
ACS-Sophor®	0.1	42
ACS-Sophor®	0.2	39
Tween20	0.1	52
Acid type Sophorolipids	0.1	46

4. Discussion

Functions required as Spreader are mainly following 4 itmes ;

Wetting property	Thickening property
Adhesive property	Permeability Property

In this study, tests of Wetting, Adhesive and Permeable properties were conducted and the results of all items are surpassing "Tween20" which is globally and commonly used as a spreader. Especially, Permeability showed significant result as if supporting the reason "Why yeast produce Sophorolipids?". With this property, ACS-Sophor will enhance the efficiency of pesticides and other agrochemicals by so-called "Adjuvant Effect". In particular, the spreader mixing to aerial sprayed agrochemical is the most suitable and prospective application for our ACS-Sophor due to its natural and green properties. And even if being dried, Adhesiveness would be remained since Sophorolipids is alkylpolyglucoside.

Last but not least, we recommend 0.2% concentration of ACS-Sophor® to maintain the surface tension below 40mN/m which is recognized as sufficient level of spreading ability.