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1. Introduction

Today, it is said that problems of agricultural formulation and application are reducing cost, environment safety and laborsaving. For approach to resolve the problems, there is a method of increasing the effect of agricultural chemicals by adjuvant and we have struggled with these problems to achieve the reducing pesticide (such as reduction of concentration, spray frequency, and spray volume). We have developed a new adjuvant (Polyoxyalkylene ester type surfactant (KP-5145)) which shows the superior wetting performance by the interfacial control technology. We report that KP-5145 has high performance of wetting and spreading and increases the insecticide effect (rain-fastness and reducing pesticide).

2. Methods

Wetting performance test: The leaves of barnyard grass, cabbage, wheat, onion and soybean as 1 month after seeding were gathered. 5 μ L-droplet was dropped on the leaf and the wetting area after one minute was measured. Dilution rate of the pesticide formulations were each recommendation rate and KP-5145 was 1000 times.

Killing insect test: We prepared contact pesticide (commercial product R; which has S-methyl-N-[(methylcarbamoyl)-oxy]-thioasetoimidate) and systemic pesticide (commercial product O; which has acephate). We used cotton aphids as harmful insect brought from chrysanthemum, and harbored cotton aphids with using paintbrush on cabbage leaves of 5-leaf stage and chrysanthemum leaves of 10-leaf stage. The number of parasitized cotton aphids was about 10 to 30. In case of contact pesticide, pesticide and adjuvant were diluted to prescribed concentration and we sprayed 1mL solution on the leaf with cotton aphids. After drying, cotton aphids were cultivated on leaves in laboratory dish at 23 ° C, it was observed life and death a day later. The life and death was judged whether move or not by stimulating the cotton aphids using paintbrush while observing it with the microscope. Meanwhile in case of systemic pesticide, we sprayed 1mL solution on the leaf without cotton aphids and harbored cotton aphids after 5hr of spraying. It was judged as same as above method. The rain-fastness was measured that it was rained 30mm/hr strength at 1hr and 3hr after spraying of pesticide, and cotton aphids were parasitic after raining.

3. Results and discussion

The 5 μ L-water droplet showed 3mm² wetting area on barnyard grass which showed high contact angle 130 degrees or more by water. POE methyl polysiloxane and POE alkyl ether (comparison products) which were ordinary wetting agent showed about 30mm², and KP-5145 which was the high wet performance adjuvant showed 110mm². On cabbage, wheat, onion and soy bean, it showed also same wetting effect. It was observed by microscope that this high performance leaded high spreading on the leaves, droplet of pesticide approached to insect, and covered on insect surface.

Using KP-5145 for a tank-mix adjuvant of a pesticide, killing rate of product R alone

was 76%, POE methyl polysiloxane was 84% and KP-5134 was 95% on hydrophobic broad leaf of cabbage. On chrysanthemum leaf which was hydrophilic broad leaf, it was also same effect. KP-5145 showed possibility of 50% reducing pesticide. In case of product O, KP-5145 showed possibility of rain-fastness that killing rate of pesticide alone was 11%, comparison product was 15% and KP-5145 was 31%, as it rained at 1hr after spraying.

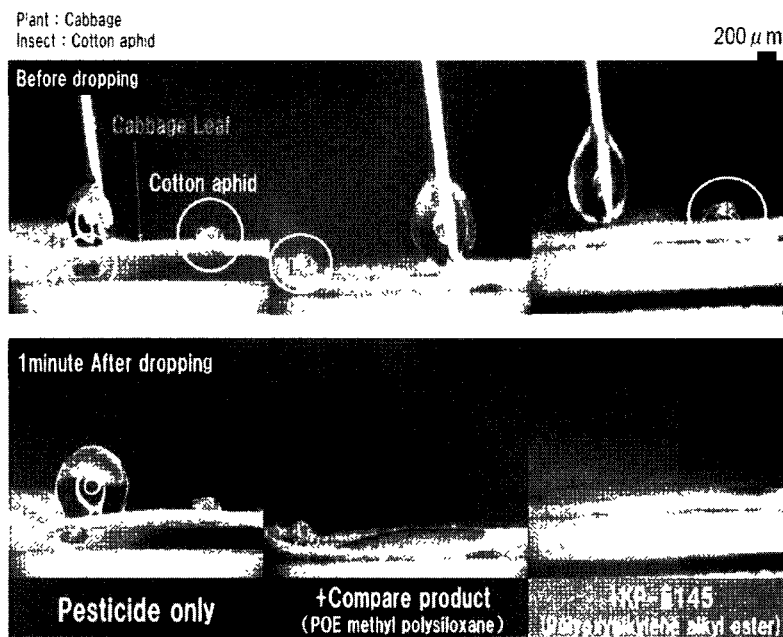


Fig.1 Effect of KP-5145 for spreading on cabbage leaf and covering cotton aphid

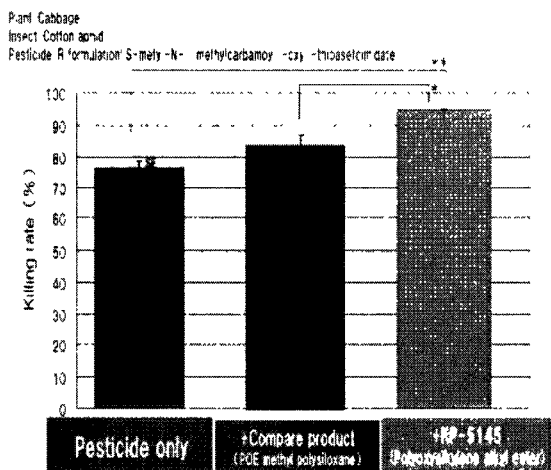


Fig.2 Effect of KP-5145 for killing rate

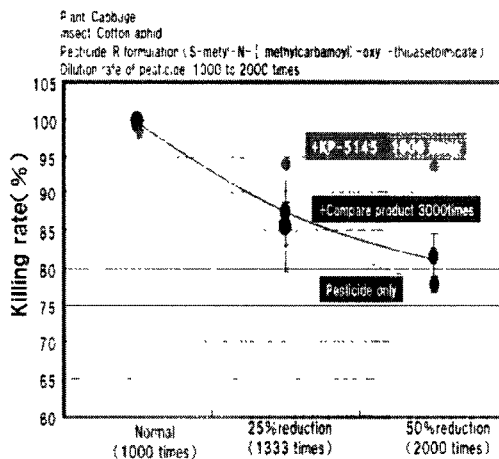


Fig.3 Effect of KP-5145 for reducing pesticide