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Control of Soybean Aphids with Super Low-Dose Spraying: Efficacy and Labor Savings

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The soybean aphid (*Aphis glycines* Mats.) is a major insect pest in soybean production areas, with annual occurrences causing serious damage to the soybean crops. The purpose of this experiment was to compare the control effect on soybean aphid and working efficacy of two methods of spraying with Dimethoate, namely, super-low volume spraying and conventional volume spraying, carried on the back with a manual compression operation. The results obtained are as follows.

1 materials and methods

1.1 Materials

Spraying equipment: super-low volume sprayer X-J model (made in the UK) and a conventional volume sprayer carried on the back with a manual compression operation. (Changjiang 10-A model made in Suzhou spraying equipment plant，Jiangsu Province)

Pesticide: 40% Dimethoate emulsion. (manufactured by Xincheng chemical plant, Shenyang city).

Soybean variety: Ha77-7578.

1.2 Methods

The quantity of flow and spraying breadth of two sprayers were each determined before spraying. Following the dosage (50ml) /per mu (commodity product dosage), the walking speed was calculated. The test was arranged with the method of large section contract with no replication. The blank control consisted of no chemical spraying.

The number of soybean aphids was surveyed at fixed point and fixed plants before spraying. Two and four days after spraying the survey was repeated. Then the population decline rate was calculated, and the control effect on the soybean aphid and work efficacy of the two kinds of sprayer with Dimethoate were compared.

2 Results

2.1 Control effect

Under the same conditions, i.e. using 40% Dimethoate emulsion with a dosage of 50ml/per mu (a.i. 20 gram), the control effect of two kinds sprayer were compared. The results indicated that the control effect of super-low volume sprayer were 93.77% two days after spraying, 83.98% four days after spraying - higher than that of the conventional volume spraying, which were 81.11% and 39.07% respectively for the same days (Table1).

Table 1 Comparison of two kinds of spraying mode 1986

Treatment	Control area (mu)	No. of aphids before spraying (individual)	No. of aphids after spraying		Control effect (%)	
			Two days	Four days	Two days	Four days
Conventional spraying	0.47	540	102	329	81.11	39.07
Super low volume spraying	2.36	1011	61	162	93.71	83.98
Control (blank)	0.47	577	1085	2540	-	-

Note: soybean plant high 60cm, density 15 plants/m^2, 19,July spraying, 1ha=15mu

2.2 Work efficacy

The super low volume spraying with 40% Dimethoate emulsion to control soybean aphids could spray 20mu per hour, but the method of conventional volume spraying only sprayed 0.5mu per hour. Work efficacy of the former was 40 times compared with that of the latter (Table 2).

Table 2 Comparison of work efficacy of two kinds of spraying methods

Treatment	Velocity of flow (ml/second)	Spraying breadth (m)	Walk speed (m/second)	Dosage ml	Water (kg)	effect/mu mu/hour	proportion
Conventional spraying	8.33	0.7	0.20	50	40	0.5	1
Super low volume spraying	0.83	4.2	0.88	50	0.1	20	40

The test indicated that under suitable weather conditions, namely a wind speed of 1-5 meters and little or no updraft condition, controlling soybean aphid using super low volume spraying could not only greatly increase work efficacy, but also increase the control effect.