Evaluation of Biological Activity of Plant Oils and Soaps, towards to *Sphaerotheca Fuliginea*

D. GANCHEV and A. NIKOLOV
*Agricultural University, Department of Agroecology, BG - 4000 Plovdiv, Bulgaria*

**Abstract**


In spring and summer of 2003, in Agricultural University in town of Plovdiv, were conducted a trials to control *Sphaerotheca fuliginea* on cucumber plants growing under greenhouse conditions, with plant oils and soaps. We tested a refined grape - seed oil, emulgated with soybean lethicin, oil and it's soap derived from plants witch are from *Brassicaceae* family, and treatment with soy-bean lethicin on one's own. A mineral oil applied in Bulgaria as pesticide under target name RZ Maslo was used as standard, and water treatment - as control. The results shown a high curative action of water emulsion of grape-seed oil. The oil and soap from plant from *Brassicaceae* family had a more strong preventive action, the soybean lethicin - alone treatment - the same action. A tests with grape-seed oil water emulsion was conducted to determine inhibition of fertility of cucumber pollen - they showed decreased germination of pollen die of treatment with grape-seed oil water emulsion, corresponding with doses of application - lower doses - lower inhibition. Another tests with the same oil and with oils and soaps derived from plants from *Brassicaceae* family were conducted to determine theirs phytotoxic behavior according to cucumber plants.

**Key words:** plant protection, oil, soap, lethicin, powdery mildew, cucumbers, pollen fertility, phytotoxic

**Introduction**

In nowadays, biological agriculture has more and more important role. One of the main critical factors of its progress is lack of enough reliable environment friendly pesticides. The plant oils and soaps are known from many years as steady fungicides and insecticides, with preventive and curative action, which are safe for environment, people, mammalian, birds, and particularly for useful insects, mites, fungi (Baker, 1994; Jullien, 2000; Moschettii 2002). They are also very stable according to resistance of pests i.e. their killing action is suffocation and washing the wax layer of pests, so the probability of mutations leading to resistance in pests is very, very low (Naum and Neuman, 1975; Horst, 1992; Schlosser and Steinhauer, 1998).
Our main goals was to formulate crop protection pesticides on base of plant oils and soaps; to test fungicide activity of these pesticides towards to *Sphaerotheca fuliginea* (protective and curative activity), and it's phytotoxic activity on cucumber plants, growing under greenhouse conditions; to conduct tests in order to determine inhibition of fertility of cucumber pollen.

**Materials and Methods**

We tested two kinds plant oils, their relevant soaps, and used emulgator (soybean lethicin) - along treatment. One plant oil was refined grape-seed oil (MGRE), other was oil derived from plant from *Brassicaceae* family (MRE, MRS - reve-lant soap). The standard treatment was with mineral oil, register in Bulgaria under target name RZ Maslo", control treatment was with distilled water. The tests was conducted in spring and summer of 2003, in Agriculture University in town of Plovdiv, and variety Gergana of cucumber plants was used. Preventive action of water emulsions was determine on cucumber plants (phenophase "3-5 leaf"), witch were treated with spore suspension of conidio spores from *Sphaerotheca fuliginea* (3*10^4* spores/ml) 24 h before treatment with oils and soaps emulsions. Curative action was determine when inoculated plants were treated 6 days after inoculation. The reading of results was conducted between 10 and 14 day after inoculation, as counting of leaf fungi coating spots and determines their diameter (mm). Simultaneously with determination of preventive and curative action, was set phytotoxic behaviors of oils and soaps according to cucumber plants. The collected data was mathematically and statistically analyzed by method of Mc. Kyney. The inhibition of pollen was determined as pollen from cucumber plants was added to 1 % sugar solution (30 pollens per visual field). The laboratory slides were treated with MGRE and after drying of water emulsion, the sugar solution was added - one drop per slide and the results was statistically analyzed.

**Results and Discussion**

The final results of conducted tests show high curative fungicide activity of water emulsion of MGRE pesticides applied twice in 0.5 % and 0.75 % concentration, especially after second treatment (Figure 1). However preventive fungicide activity was very low (Figure 2). MR pesticides (oil - MRE and soap - MRS) show higher preventive fungicide activity (Figure 3) than curative activity (Figure 4), the development of pathogen was inhibited significantly during 6 - 10 day after treatment, but after 10 day - the development of *Sphaerotheca fuliginea* increase and it reach the maximum at 20 - 21 day after treatment. The soap (MRS) show lower fungicide activity than oil (MRE) - Figures 3 and 4. The lethicin emulgator applied as fungicide, as preventive treatment show very strong but short-term effect - up to 7 - 9 day after treatment, and good curative action (Figure 5).

Regarding to phytotoxic behavior of MGR and MR pesticides, a tests con-
ducted with MGRE (0.5% and 0.75 %) on cucumber plants showed that pesticide in 0.5 % concentration had none phytotoxic action, and it was low phytotoxic in 0.75 % concentration (Figure 6). Another tests with MRE and MRS pesticides applied as preventive treatment showed that they had also low phytotoxic action (Figure 7), greater in presence of MRS. Applied as curative treatments, the same pesticides showed none phytotoxic action (Figure 8).

According to tests with cucumbers’s pollen and MGRE pesticides, Figure 9 show that there was suppression towards to control variant, weaker in 0.5 % concentration and stronger in 1.00 % concentration.
Fig. 5. Lethin preventive application

Fig. 6. MGRE pesticide phytotoxic behavior - curative

Fig. 7. MR pesticides phytotoxic behavior – preventive

Fig. 8. MR pesticides phytotoxic behavior – curative

Fig. 9. MGRE pesticide pollen inhibition
Conclusions

We established a clearly manifest antifungal activity in curative treatment of water - oil emulsion of MGR pesticides in 0.5% and 0.75% concentration, especially after second treatment. The preventive activity of same pesticides was significantly low.

According to MR pesticides, they showed exactly contrary results - higher efficiency in preventive treatment, lower in curative treatment.

A commercial pesticide "RZ Maslo" registers in Bulgaria as insecticide showed a good curative efficiency towards to Sphaerotheca fuliginea.

The emulgator (soybean lethicin) manifested a good, but short-time preventive effectiveness towards to Sphaerotheca fuliginea, and satisfactory curative action.

All phytotoxic and pollen tests showed that pesticides used in this study had low phytotoxic behavior towards to cucumber plants.

References


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