

EXPLORING NOVEL TECHNOLOGY TO FIGHT AN ANCIENT AGRICULTURAL ENEMY

Report to “Global Perspectives,” College of Agriculture and Natural Resources

**by Alex Latchininsky, Professor
Dept. of Ecosystem Science and Management**



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Award Period (e.g. Spring 2012): Fall 2017

Principle Investigator(s) Alex Latchininsky

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Amount spent: \$5,000

SUMMARY

Four field trials investigating efficacy of biopesticide Novacrid® were conducted in Uzbekistan against hoppers of Moroccan *Dociostaurus maroccanus* and Italian *Calliptamus italicus* locusts. Applied at 50 and 25 g/ha, the biopesticide caused 62 to 68% hopper mortality 18 days posttreatment. When the spores were protected by nano-capsules, the biopesticide efficacy increased to 94%. Protective nano-capsules also increased spore viability from 34 to 78% 18 days posttreatment.

Front page figure: hopper covered with spores of *Metarhizium sp.* fungus. Photo by W. Dakhel, UW.

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Funds awarded: \$5,000 from Global Perspectives and
\$2,000 from UW Faculty International Travel Program.

Project Objectives:

- To plan, design and execute, in collaboration with Uzbek colleagues, large-scale field trials of novel technology – protective nano-capsules for pathogen spores – to control pest locusts and grasshoppers in Uzbekistan;
- To analyze pathogen spore viability in the field with or without the protective nano-capsules;
- To analyze locust mortality in the field and choose the most effective combination of pathogen/dose rate;
- To put together a manuscript summarizing the project finding for submission to a peer-reviewed outlet.

Results:

As planned, A. Latchininsky traveled to Tashkent, Uzbekistan and from there to Nukus, Karakalpakstan, in May and June 2018, to conduct four field trials with fungal pathogens.

Trial 1. Target: Moroccan locust *Dociostaurus maroccanus* (Thunberg, 1815) 3rd and 4th instar hoppers were treated with biopesticide Novacrid® (active ingredient: fungus *Metarhizium acridum*) at a dose rate of 50 g/ha. Seventeen days after treatment, hopper mortality was 62% on site A and 64% on site B (compared to untreated control: 4%).

Trial 2. Target: Italian locust *Calliptamus italicus* (Linnaeus, 1758) 2nd and 3rd instar hoppers were treated with biopesticide Novacrid® (active ingredient: fungus *Metarhizium acridum*) at a dose rate of 25 g/ha. Eighteen days after treatment, hopper mortality was 67% on site A and 68% on site B (compared to untreated control: 11%).

Trial 3. Target: Italian locust *Calliptamus italicus* (Linnaeus, 1758) 2nd and 3rd instar hoppers were treated with biopesticide Novacrid® (active ingredient: fungus *Metarhizium acridum*) at a dose rate of 25 g/ha, with protective nano-capsules. Eighteen days after treatment, hopper mortality was 92% on site A and 94% on site B (compared to Trial 2 without protective nano-capsules above). All three trials were done using vehicle-mounted Ultra-Low Volume (ULV) sprayer Micron AU 8115 at a rate of 2 l/ha.

Trial 4. Spores of *Metarhizium acridum* were exposed to field conditions for 18 days with and without protective nano-capsules. After 18 days, spore viability was 34% without and 78% with nano-capsules.

Conclusions:

Biopesticide Novacrid® is effective against hoppers of Moroccan and Italian locusts at dose rates of 50 and 25 g/l; the latter dose is more economical. Protective nano-capsules significantly enhance its efficacy and protect spores from ULV and other environmental impacts.

Reporting:

Results of the field trials were reported at annual Technical Workshop on locusts in Caucasus and Central Asia conducted by Food and Agriculture Organization of the United Nations (FAO UN) in Bishkek, Kyrgyzstan, 19-23 November 2018.

Future plans:

Peer-reviewed manuscript is being prepared summarizing the results of the trials, in collaboration with Uzbek colleagues.

Results will be reported at 13th International Congress of Orthopterology in Agadir, Morocco, 24-28 March 2019.

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Figures (by F. Gapparov, Uzbek Institute for Plant Protection)



Figure 1. Preparation of biopesticide formulation.



Figure 2. Treatment with biopesticide Novacrid® by vehicle-mounted Micron AU8115 Sprayer.



Figure 3. Field cage with hoppers to observe their mortality after treatment.



Figure 4. Collecting hoppers from the treated area.



Figure 5. Moroccan locust 2nd instar hoppers basking.