International Organization for Biological Control
East Palearctic Regional Section

INFORMATION BULLETIN

IOBC EPRS

46

Plant Protection for Ecological Sustainability of Agrobiocenoses

April 2014

ACTION OF PESTICIDES FROM NEONICOTINOID GROUP ON NON-TARGET ARTHROPODS INDICATOR SPECIES

Kozhabayeva G.[1], Temreshev I.[2], Childebaev M.[2]
[1]The Kazakh Research Institute for Plant Protection and Quarantine,
[2]Institute of Zoology, Almaty, Kazakhstan, luch.78 @ mail.ru

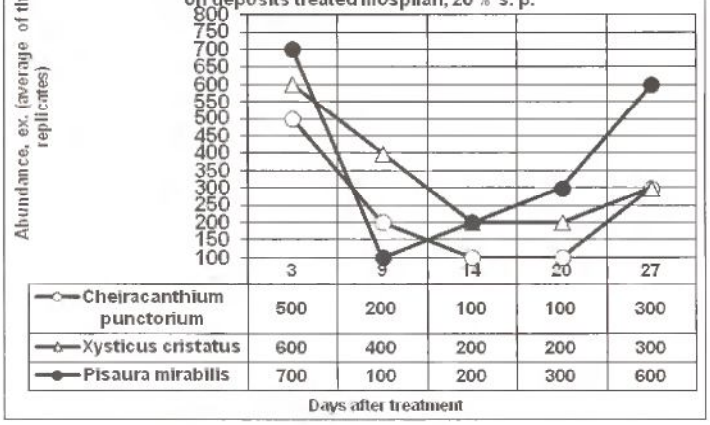
Chemical insecticides are currently the most effective and widely used means to protect plants from pests. However, their side, or misuse, the impact on the biota of the treated components is still poorly studied. In most countries, the criteria for admission to the use of modern insecticides hardly affect their impact on non-target organisms. They are based mainly on the application rate and persistence. There are publications on the effects of insecticides on different groups of non-target arthropod fauna in Kazakhstan. In one of them we provided data from the action of neonicotinoids- konfidor extra and mospilan on non-target invertebrate fauna [1-4]. Currently neonicotinoid group of pesticides registered Ministry of Agriculture of Republic of Kazakhstan; there are about 20 names [5]. However, the works that reflect their effect on the individual indicator species are absent. This information aims to fill this gap.

Studies on the action of insecticides non-target arthropod fauna were carried out on the territory of experimental industrial enterprise "Irtysh" Pavlodar region (N 53°24′48″, E 75°21′35″, 95meters above sea level). For research used drugs konfidor extra, w.d.g. and mospilan 20%, settlement. Treatment plots drugs were held knapsack atomayzer sprayer AU- 8000, from 20 June to 17 July. The size of the plots for each drug was 0.25 ha (50 m x 50 m). Vegetation cover deposits consisted mainly of *Artemisia* and loach *Ceratocarpusarenarius* field with small patches of *Alfalfa* and other legumes. Plot treated konfidor was thick and covered with sagebrush field bindweed (projective cover 100%) than the portion treated mospilan where *Ceratocarpus* was not less than 50 % of the total (95% projective cover). Gathering material was carried out using standard cutting butterfly net. Per unit accepted accounting mowing 25 net sweeps in 3 replicates. Mowing evenly covers both the lower and upper tiers of vegetation. Materials each replicate evolved separately in plastic bags filled with paper and a cotton swab moistened with ethyl acetate. Each packet is provided with a suitable label for material identification. Been killed after material objects translated into paper bags with a label for subsequent post-processing in the laboratory. Counts were conducted at 3, 9, 14, 20 and 27 days after treatment. Total for the accounting period 9702 exemplars were collected arthropods belonging to 53 families and 10 orders of insects and spiders.

As an indicator species, we selected widespread arthropods with known biology and ecological features. This species, which are often encountered in monitoring habitats, but it is not a target for protective measures using the above drugs. Arachnids were taken from three species of spiders of 3 families with different ecology: *Cheiracanthiumpunctorium* (Miturgidae) - ambusher with hunting network, *Xysticuscristatus* (Thomysidae) - ambusher

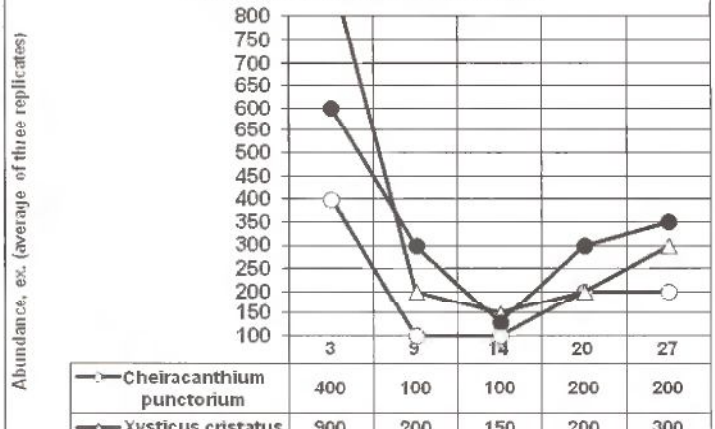
on flowers and plants without trapping network and *Pisaura mirabilis* (Pisauridae) - active, run wild predator. Insect - several species of beetles (the largest, mass and widespread insect order): *Tychiusmedicaginis* (Curculionidae) - phytophage of seeds, *Gastrophysapolygoni* (Chrysomelidae) - phytophage of leaves and *Attagenussimulans* (Dermestidae) - nekrofages. Population dynamics of arthropod indicator species for monitoring sites is shown in Figures 1-4.

Figure 1. Population dynamics of several species of spiders on deposits treated mospilan, 20 % s. p.

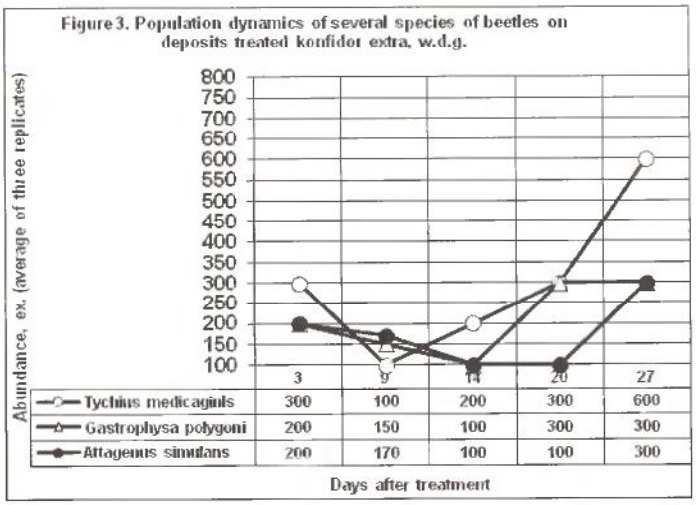


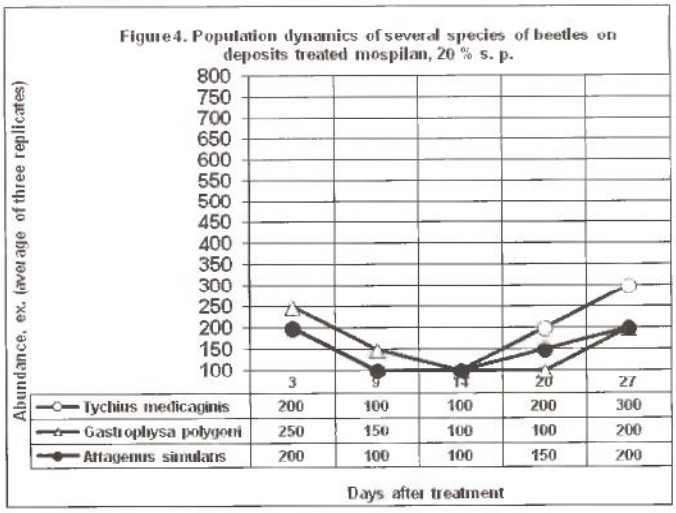
	3	9	14	20	27
Cheiracanthium punctorium	500	200	100	100	300
Xysticus cristatus	600	400	200	200	300
Pisaura mirabilis	700	100	200	300	600

Figure 2. Population dynamics of several species of spiders on deposits treated konfidor extra, w.d.g.



	3	9	14	20	27
Cheiracanthium punctorium	400	100	100	200	200
Xysticus cristatus	900	200	150	200	300
Pisaura mirabilis	600	300	130	300	350





In control plot number as indicator species of spiders and beetles remained virtually unchanged.

According to the research, we can conclude of insecticides from neonicotinoid groups, in particular, konfidor extra and mospilan, no appreciable adverse effects on non-target indicator species of Coleoptera. Almost all species of beetles on the treated area regained its strength on the 27th day after treatment. In some species, it has even increased, for example, the weevil *T. medicaginis*. This is explained by the peculiarities of biology and phenology of species - continued output of young adults from the soil where they were earlier in the pupal stage. More noticeable effects of these drugs on the indicator of spiders species. All they were able to restore their numbers at monitoring sites to its original level. Was slightly higher than the number of *P. mirabilis*, which can be attributed to this kind of environment - it is actively moving predator and not ambusher associated with plants, as two other species. Its population was subjected to less pressure during the treatment due to the high mobility of individuals, as well as the migration of this species of spiders from

neighboring plots. Because spiders are important as active mass predators in food chains of different ecological communities, then it should pay attention to when planning and carrying out protective measures.

REFERENCES

1. Sokolov A. Adonis Effect on non-target arthropod fauna // Plant Protection and Quarantine in Kazakhstan. - 1999. – Vol. 4. - P. 12-16.

2. Childebaev M. Influence of some insecticides on non-target arthropods fauna grass // Plant Protection and Quarantine in Kazakhstan. - 2001. – Vol. 1. - P. 15-18.

3. Childebaev M. Environmental monitoring of non-target organisms in chemical treatments against harmful locusts in northern Kazakhstan // Plant Protection and Quarantine in Kazakhstan. - 2003. – Vol. 1. - P. 28-34.

4. Kozhabayeva G., Childebaev M., Temreshev I. Effect of insecticides konfidor extra, w.d.g. and mospilan 20%, s. p. on non-target terrestrial arthropods fauna // Bulletin ofthe Kazakh National University. Biology Series. - 2014. – Vol. 1/2 (60). - P. 64-68.

5. Directory of pesticides (insecticides), approved for use in the Republic of Kazakhstan. –Almaty: Advertising agency "AHEC", 2012. - 204 p.