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## **Choosing predators for biocontrol of Colorado potato beetle in the South Ural.**

### **Introduction**

Invasive species are the most problem in ecology. Trophic relationships of invasive species are very important for designing methods of pest management and biocontrol. We are researching the adaptation processes in predators proceeding to feed by Colorado potato beetle (*Leptinotarsa decemlineata* Say) in the South Urals. This species is invasive. It has appeared in South Urals 34 years ago. Complex of predators living in potato field is formed since its arrival.

*Key word: colorado potato beetle, natural enemy, coccinella septempunctata, trophic stress induction*

### **Materials and Methods**

#### **PCR – analysis of predators gut content.**

Predatory insects were caught in antifreeze (water solution of ethylenglicol) (Weber et al, 2009) and were preserved for a week. We extracted DNA from gut and its content; also we extracted DNA from other tissues (muscles, fat body). These samples of DNA were used for PCR with specific primers designed from COI of *L. decemlineata* (Greenstone et al, 2007). Predation in the insects can be detected by PCR analysis with species-specific primers even through 24 hours.

#### **Demonstration of stress induction.**

The level of stress induction are detected analyzing activity of acetylcholinesterase and concentration of catecholamines in the imago's hemolymph in 2 and 18 hours after feeding (aphids, eggs of *L. decemlineata*, homogenates of larvae *L. decemlineata*).

Activity of acetylcholinesterase are detected by methods of Ellman (Ellman et al., 1961). Concentration of catecholamines are determined by modified method of Ronin (Benkovskaya, 2009).

Surviving of imago *C. septempunctata* living in plastic boxes is determined in 14 days.

### **Results.**

Several species of Carabidae and Coccinellidae were caught. Seven-spotted lady beetle (*Coccinella septempunctata*), *Pterostichus melanarius*, *Harpalus rufipes* and *Calosoma investigator* are most abundant predators in potato fields. Positive results of PCR – analysis of predators gut content have been given in the case of *C. septempunctata* (fig. 1).

Stress dynamics of *C. septempunctata* imago feeding different foods showed increasing of acetylcholinesterase activity after feeding, because increased moving activity of imago. More high activity of imago feeding eggs in 2 hours and following decreasing beside in the case of feeding aphids shows fitness for feeding eggs of *L. decemlineata*, but it doesn't use always (Fig.2.).

Concentration of catecholamines changes a little and differs between variants are unreliably. Increase of repeats is claimed (Fig.2).

Surviving of imagoes feeding homogenates of larvae *L. decemlineata* presented below at 7 – 8 days (Fig.3). Homogenates are unusual food for *C. septempunctata* and caused increasing of mortality.

### **Conclusion.**

Seven-spotted lady beetle adapted for feeding eggs of *L. decemlineata*. But we don't know was this fitness existing always or it have formed recently at the period of invasion of *L. decemlineata*.

We may solve this problem when investigate population genetics of *C. septempunctata* and other predators from different localities.

### **Acknowledgment.**

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K.A. Kitaev, M.B. Udalov, G.V. Benkovskaya  
Institute of biochemistry and genetics of Russian Academy of Science, Russia.  
[cordek\(at\)ya.ru](mailto:cordek@ya.ru)

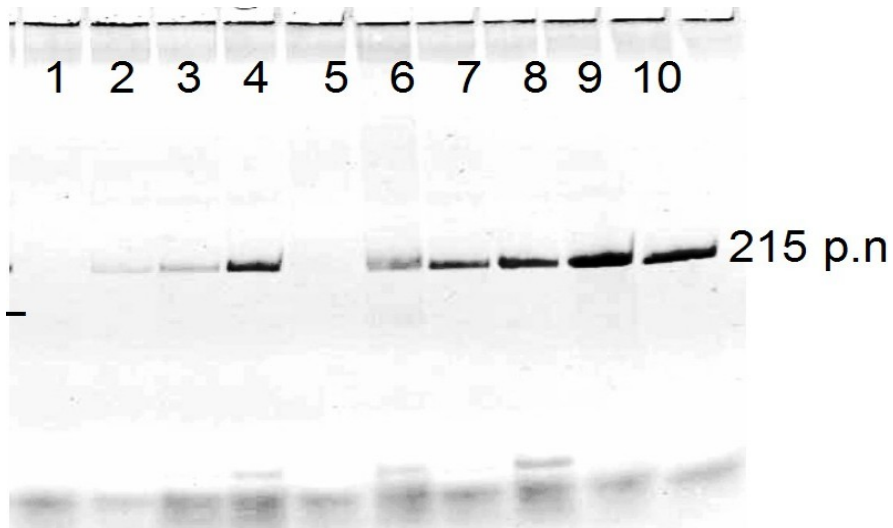


Figure 1. Gel show result of PCR – analysis of *C. septempunctata* gut content. 1-9 DNA samples of gut of *C. septempunctata*, 10 – DNA sample of larvae *L. decemlineata*.

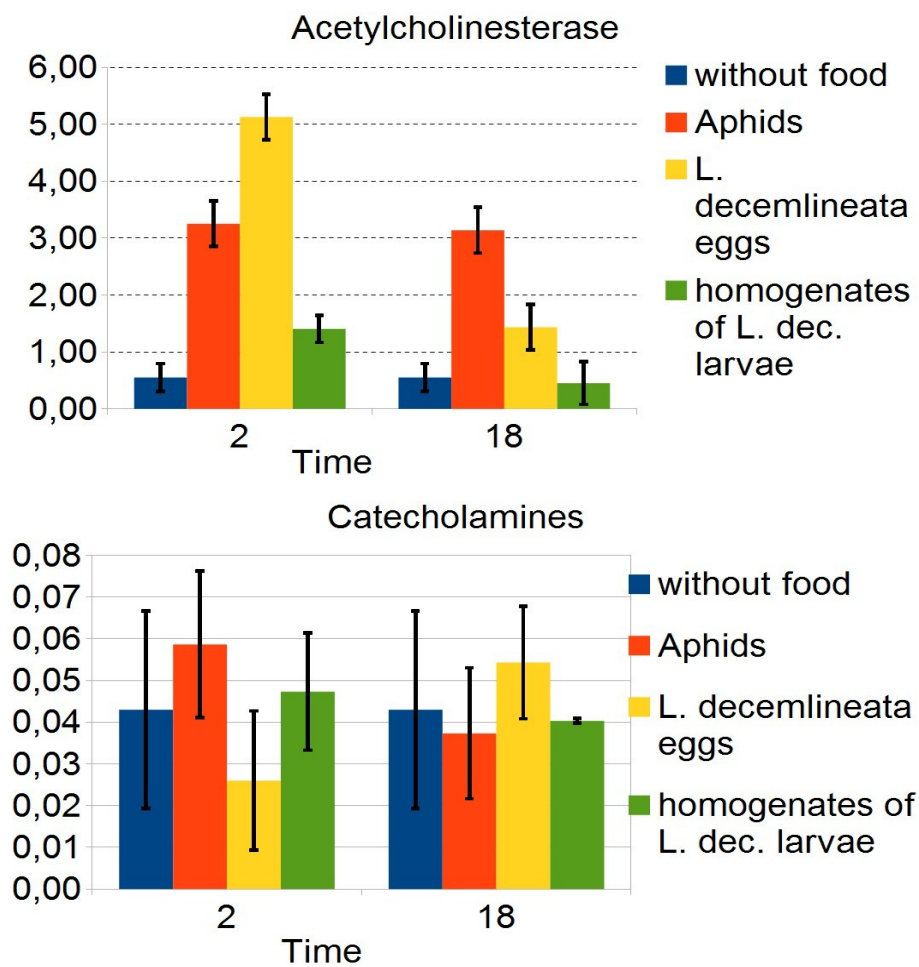


Figure 2. The level of activity acetylcholinesterase and catecholamines in the hemolymph after 2 and 18 hours. Imago *C. septempunctata* have been fed aphids, eggs of *L. decemlineata*, homogenates of larvae *L. decemlineata* before analysis.

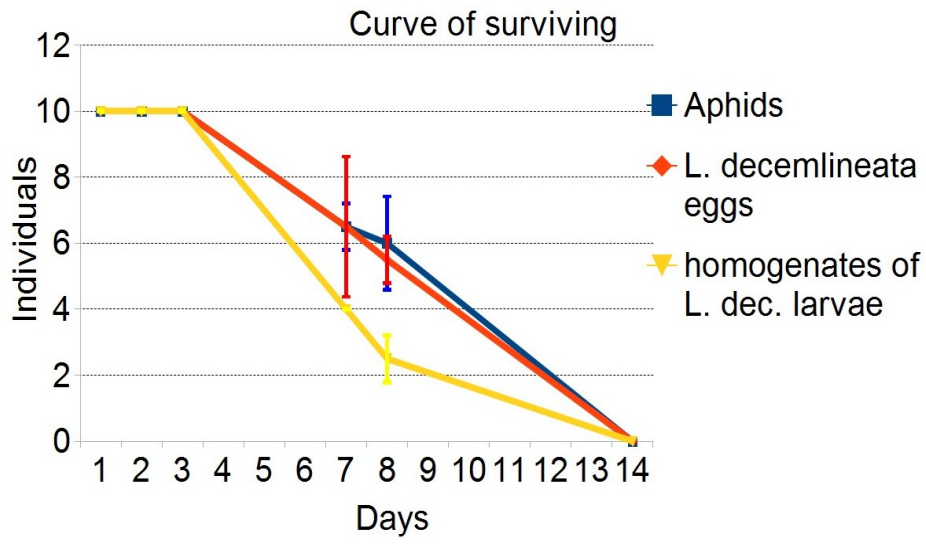


Figure 3. Surviving of *C. septempunctata* imagoes fed with different food.