

## **THE ACTIVITIES TO PRESERVE BUMBLEBEE COMMUNITIES IN ESTONIAN AGRICULTURAL LANDSCAPES**

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### **Introduction**

Bumblebees are important natural pollinators whose number is declining and one of the reasons is claimed to be changes in land use and agricultural production (Goulson et al., 2005). A possible way to mitigate such impacts and preserve bumblebees is agri-environment scheme (AES) which in Estonia has been implemented since 2004 in the frame of Estonian rural development plan (RDP). The independent evaluator for the RDP 2004-2006 AES and for Axis II measures of Estonian RDP 2007-2013 is Agricultural Research Centre (more information about evaluation: <http://pmk.agri.ee/pkt>). In the frame of AES evaluation data about bumblebees are collected and here the main results are presented.

### **Methods**

The data were collected in 2006-2008 in three regions: West, Central and South Estonia, 22 monitoring farms in each. In addition to farms where the AES was implemented (organic farming and farms with environmentally friendly production) a reference group was selected from the producers who were receiving single area payment scheme payments and were not applying for AES payments. Bumblebees were counted every year three times from June to August by using transect method (400 m of transect covered field margins and 100 m arable fields with entomophilous cultures; transect was 2 m wide). In addition, data about the use of pesticides was gathered (by interviewing the farmers or from field record books). In 2007 the average field size was also calculated for the area of 500 m around transects by using the database of Estonian Agricultural Registers and Information Board.

### **Results and discussion**

The results showed that the diversity of bumblebees (Shannon diversity index) in organic and environmentally friendly production farms was higher than in farms without AES. Meanwhile the use of pesticides had an impact on the number of bumblebees which was significantly higher in the case no pesticides were used. So, it seems pesticides affect bumblebees directly through repellency or lower food resource. At the same time production type rather affects bumblebee diversity which shows the uniformity of a community and is probably a result of more long-lasting processes. This is also confirmed by the fact that production type had an effect on bumblebee diversity above all in Central Estonia which has more intensive agriculture than in two other monitoring regions. In 2007 the relations between bumblebees (the number of individuals and species) and average field size was analyzed and a significant negative correlation was found. In addition, all bumblebee indices (the number of bumblebees and their species, Shannon diversity index) were positively correlated to the number of flowers. So, on the base of these results to mitigate the negative impacts from agriculture on bumblebees more environmentally friendly production types should be favoured, less pesticides used, large uniform fields avoided and enough food resource provided.

### **References**

Goulson, D., Hanley, M.E., Darvill, B., Ellis, J.S., Knight, M.E. 2005. Causes of rarity in bumblebees. *Biological Conservation*, 122, 1-8.

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