

# THE ACTIVITIES TO PRESERVE BUMBLEBEE COMMUNITIES IN ESTONIAN AGRICULTURAL LANDSCAPES

Eneli Viik<sup>1,2</sup>, Marika Mänd<sup>2</sup>, Riin Muljar<sup>2</sup>

<sup>1</sup>Agricultural Research Centre, Riia 24D, Tartu, 51010, Estonia

<sup>2</sup>Estonian University of Life Sciences, Kreutzwaldi 1, Tartu, 51014, Estonia

Photo: Arne Adar  
(www.loodusemees.ee)



## 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.
- ❖ 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.
- ❖ In the frame of AES evaluation (responsible institution is Agricultural Research Centre) data about bumblebees are collected and here the main results are presented.

## METHODS

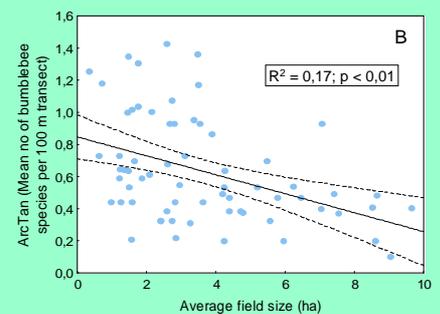
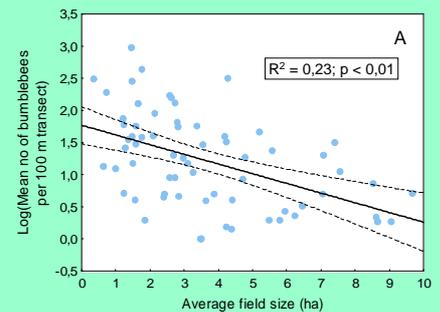
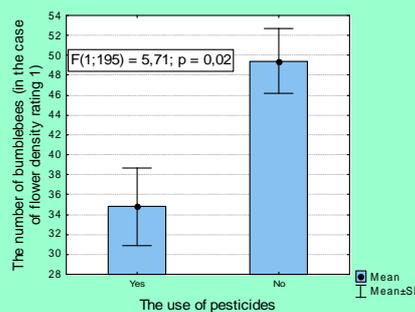
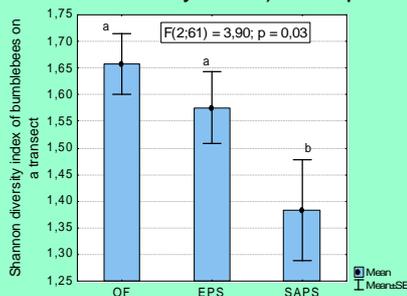
- ❖ The data were collected in 2006-2008 in three regions: West, Central and South Estonia, 22 monitoring farms in each (66 in total). Monitoring sample consisted of farms with organic farming scheme and environmentally friendly production scheme (both under AES). In addition, a reference group was selected from farms 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). The density of flowers was also evaluated.
- ❖ In addition, data about the use of pesticides in 2006-2008 was collected (by interviewing the farmers or from field record books).
- ❖ In 2007 the average field size was calculated for the area of 500 m around transects and analyzed with bumblebees data collected on field margins.



Photo: Ere Ploomipuu

## RESULTS

- ❖ The diversity of bumblebees (Shannon diversity index) in farms with organic farming scheme and environmentally friendly production scheme was significantly higher than in farms without AES (figure 1).
- ❖ The use of pesticides had an impact on the number of bumblebees which was significantly higher in the case no pesticides were used (figure 2).
- ❖ In 2007 the relations between bumblebee indices (the number of individuals and species) and average field size was analyzed and a significant negative correlation was found (figure 3).
- ❖ In addition, all bumblebee indices (the number of bumblebees and their species, Shannon diversity index) were positively correlated to the number of flowers.



**Figure 1.** Bumblebees' Shannon diversity index in farms with organic farming scheme (OF), environmentally friendly production scheme (EPS) and in farms without AES (SAPS) (2006-2008)

**Figure 2.** The effect of pesticides usage on the number of bumblebees (2006-2008)

**Figure 3.** The impact of average field size on the number of individuals (A) and species (B) of bumblebees (2007)

## CONCLUSIONS

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.

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.



Photo: Evelli Viik

## Further information

More information about the evaluation of Agri-Environment Scheme in Estonia can be found on the homepage of Agricultural Research Centre who is independent evaluator for the RDP 2004-2006 AES and for Axis II measures of Estonian rural development plan 2007-2013: <http://pmk.agri.ee/pkt>.