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Enhancing ecosystem service provision by floral biodiversity in long-term set-asides

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In Finland, green set-asides are included in agri-environmental scheme (2007-2013) for promotion of biodiversity. However, they are usually established by sowing a mixture of competitive grass species. For biodiversity, a more beneficial option would be the sowing of less competitive grass mixture with meadow plants. We studied the impact of seed mixture and mowing of set-asides on three ecosystem services: availability of seed- and chick-food for farmland birds and pollination.

A long-term set-aside experiment was established in southern Finland in 2003. The experiment was conducted on a clay soil as a strip-plot design with four replicates. The size of each experimental plot was 0.25 ha (50 m x 50 m). The treatments of experiment comprised on three seed mixtures (1) standard: *Trifolium pratense* - *Festuca pratensis* - *Phleum pratense*, 2) less competitive grass mixture: *Agrostis capillaris* - *Festuca ovina* and 3) less competitive grasses with twelve meadow plant species) and two mowing treatments (mowing yearly and no mowing). Samples on plants and seeds, pollinators and arthropods were collected in 2003-2006.

For the seed-food production, mowing had positive and the age of the set-aside negative impact, whereas the seed mixture had no impact but the interaction of year and seed mixture was detected. The highest chick-food production (measured by total catch of D-vac-sampler) was detected in standard seed mixture. However, species composition differed among seed mixtures and years; therefore superiority of seed mixture was depended on the arthropod group. Mowing reduced most the number of Dipteras. Species richness of pollinators increased throughout the four-year experiment in all treatments. Pollinator species richness and abundance were highest during the whole experiment in the seed mixture containing meadow plants but the difference to the other seed mixtures decreased during the last two years. This was largely explained by increasing abundance of *Cirsium arvense* in the unmown treatments. The experiment showed that the benefits of applying alternative seed mixtures vary between ecosystem services. This suggests that the promotion of each ecosystem service requires specific management.