# Field experiment on longevity of the seeds in the soil seed bank (initial seed burial experiment at the University of Natural Resources and Life Sciences BOKU)

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## Introduction

In 2011 the BOKU started an initial burial experiment as the first one in the non-native region of Europe. We plan to test the viability loss of common ragweed seeds buried in a lawn at the BOKU campus in Vienna during 10 years.

## Methods

70 packages (bags of fine net-like polyethylene tissue) with common ragweed seeds collected in 2010 from an arable field nearby Unterpurkla, in Styria, Austria (each net filled with 50 seeds) were buried in the soil at 10 cm depth in early spring 2011. Every year in spring the germination test procedure will be performed on the seeds of a subsample of 7 randomly selected bags. Additionally every year the germinability of seeds from the same base sample stored continuously at 4°C under dry conditions will be tested.

The excavated seeds are tested for germinability in climate chambers (8 h light at 30°C and 16 h dark at 15°C, resp.) for 4 weeks. The germinated seeds are discarded and the still dormant ones again stratified for 6 weeks under 4°C in darkness. Afterwards a second germination trial is performed under the same condition as with the first trial. Finally all remaining seeds are checked for viability with the TTC-test.

## Results

The seed lot was tested for germinability/viability at the beginning of the experiment (spring 2011) following the procedure of article 6, section A. This test resulted in a 67% viability of the seed lot.

In spring 2012 the first set of 7 seed bags was dug out. We found almost all seeds or at least the seed coats of the provided seeds.

The viability test (germination and final TTC) gave a rather high number of dead seeds including empty opened seed coats (Tab. 1). The latter derived from seeds that germinated during the season between the digging date and the first excavation date one year later. Considering the high number of not viable seeds at the beginning of the experiment (33%), the loss of seeds during the first year was not extremely high (ca. 25% of the living stock at the beginning).

In 2013 again 7 nets were dug out and tested for germinability and viability. Interestingly the number of viable seeds per net in 2013 was higher than in 2012 (Tab. 1, Fig. 1). On the other hand the number of "intermediate" seeds was higher in 2013, compared to 2012.

Table 1: Comparison of mean percentages of seeds assigned to different status after germination and TTC-test from 2011 (before burial), 2012 and 2013.

| | Mean percentage of seeds | | |
|---|---|---|---|
| status | 2011 [1)] | 2012 [2)] | 2013 [2)] |
| alive | 67% | 39% | 54% |
| intermediate | ? | 9% | 0% |
| dead | 33% | 33% | 20% |
| empty seeds | 0 | 19% | 9% |
| fragmented | 0 | 1% | 17% |

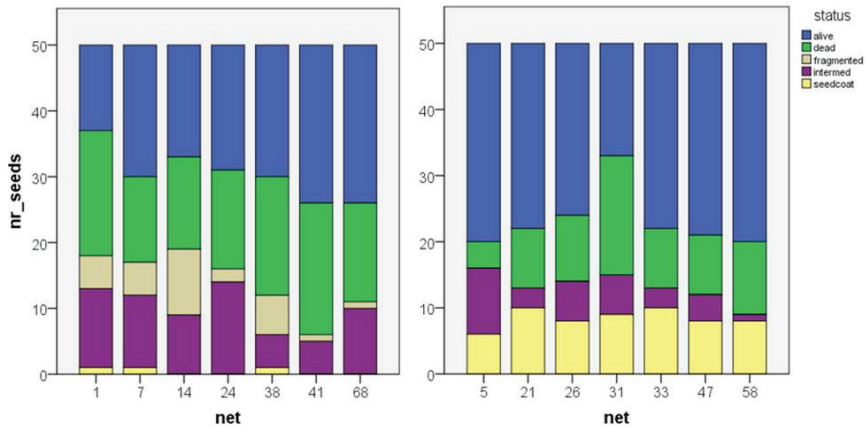


Fig. 1: Number of viable common ragweed seeds per net from Unterpurkla buried at soil depth of 10 cm, differentiated by the status of viability; test data from 2012 (left) and 2013 (right).

The overall germinability was tested when the seeds were buried in 2011 giving 66.25% germinable seeds. Interestingly, the excavated seeds from 2013 reached almost the same percentage of germinability like before being buried (Tab. 1).