

# The oat collection in Polish National Centre for Plant Genetic Resources



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- Loss of genetic diversity, a side effect of the green revolution, has provoked national and international efforts to collect and preserve the genetic diversity of crop plants and their wild relatives.
- Collecting wild relatives of oats is entirely different from collecting cultivated plants. Successful collection of wild relatives requires knowledge of botany, ecology, soil science, and geology.
- Oat collection in Polish NCPGR maintains 2620 accessions, including 138 wild ones, 240 landraces and 66 old varieties.

## The main objectives of oat collection

Preservation of common oat and its relatives through germplasm storage, characterisation and evaluation

Research

Oat breeding

Reintroduction of old varieties

## The cultivated species

- Oat is one of the most important cereal crops in the world. Common oat (*Avena sativa* L.) is a crop used primarily for animal feed, human food, and industry purposes. It is the seventh most economically important cereal and is cultivated all over the world, but majority of its production is located in Northern Hemisphere, North America, Europe and Asia. The main producers are Russia, Canada, Finland and Poland (FAOSTAT, 2017).
- Oat is better adapted to cool moist climate and acidic soils than other cereals, but is sensitive to water deficit and heat during seed formation and maturity (Murphy and Hoffman, 1992).
- Further search for agronomical traits and utilization of new oat breeding sources is very important for breeding purposes.

## The wild species

- The genus *Avena* L. includes cultivated species with different ploidy levels (diploid, tetraploid, hexaploid) and a number of wild species reflecting a wide range of botanical and ecological diversity.
- In our collection we have threatened wild oat species and those with a shrinking natural habitat including, *A. pilosa*, *A. ventricosa*, *A. damascena*, *A. atlantica*, *A. magna*, *A. murphyi*, and *A. insularis*.
- These species represent components of natural habitats in some countries on the Mediterranean coast of Africa, southern coast of Spain, Italy, Greece, and a part of Mediterranean and Atlantic islands.
- We hold the biggest collection of perennial and winter-hardy *A. macrostachya*, that has been basis for works toward creating winter oat suitable for Polish climate.

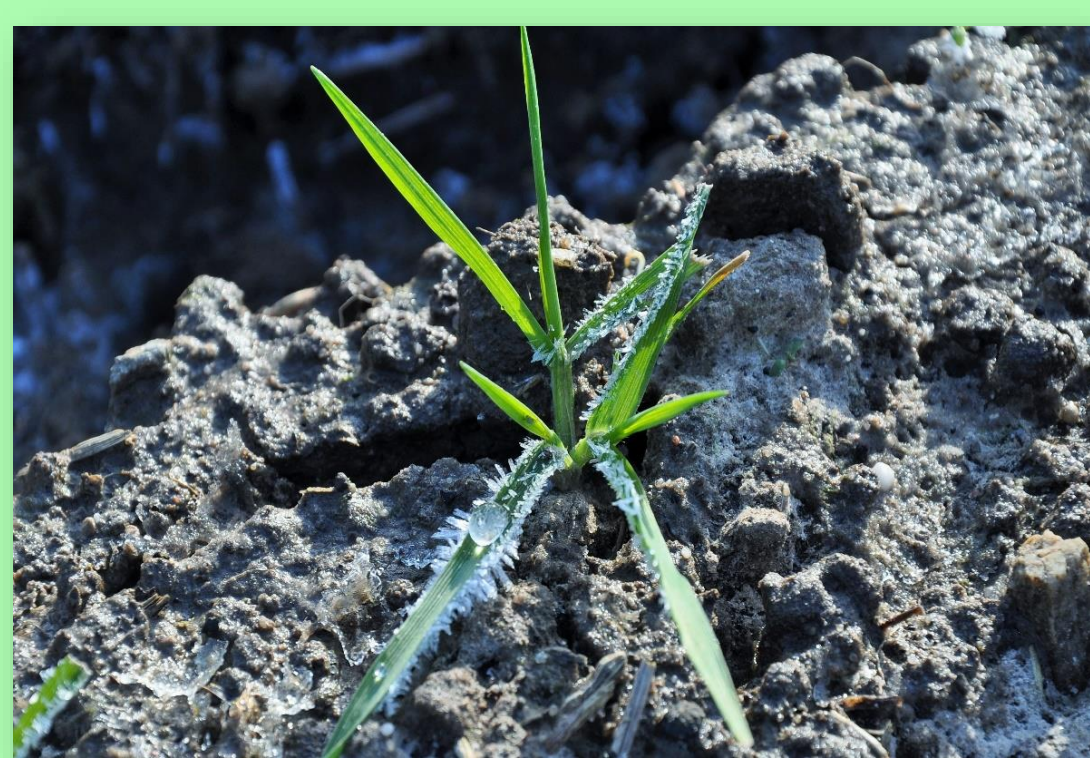


Photo 1. Oat plant in winter hardiness nursery

Chart 2. *Avena* species in Polish NCPGR collection - percent and number of species accessions

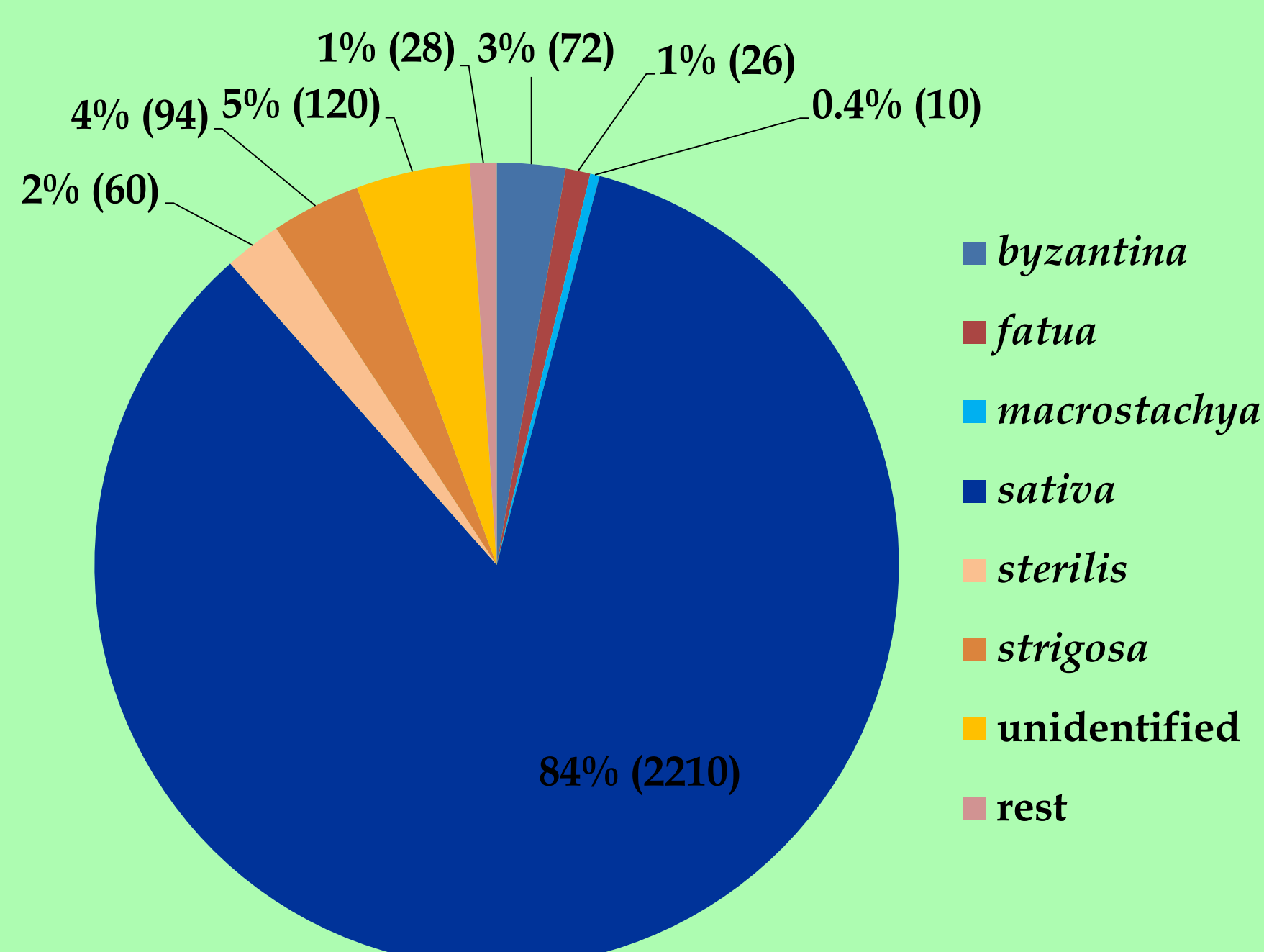
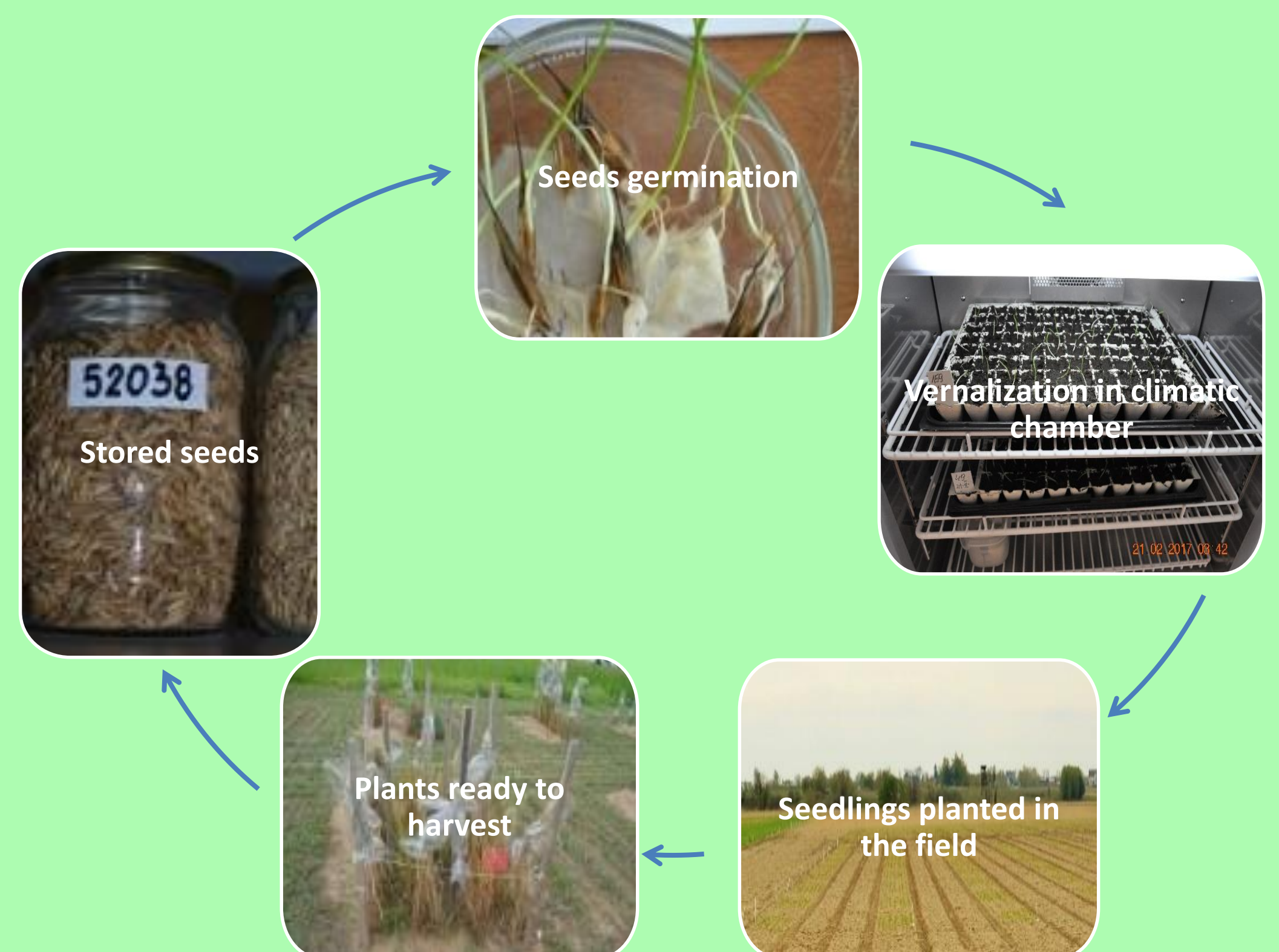
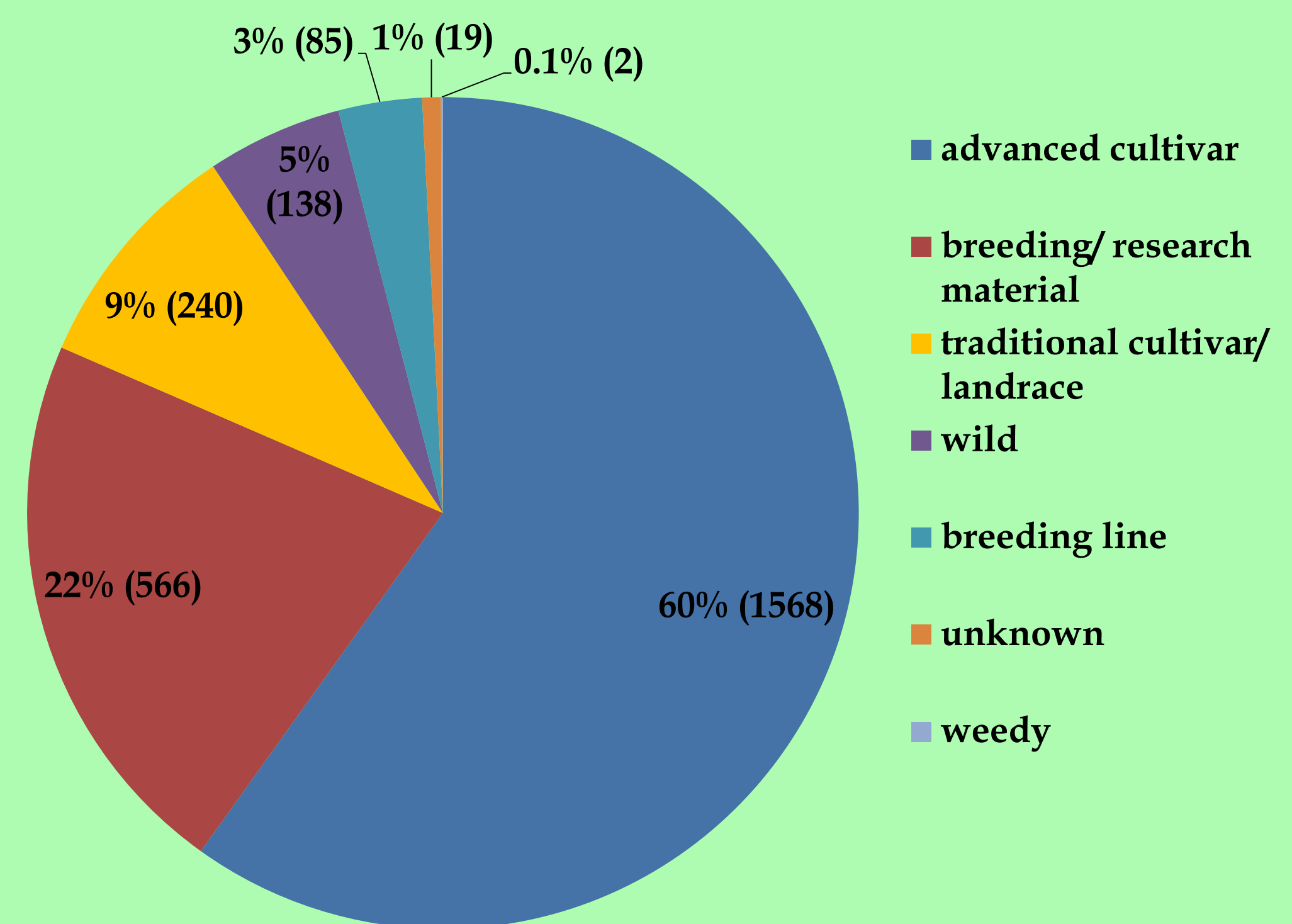


Chart 1. NCPGR *Avena* germplasm status - percent and number of genotypes



Scheme 1. Process of oat germplasm regeneration

- We implement our objectives through: characteristics and evaluation of accessions by means of: botanical identification, morphological characteristics, basic agricultural traits evaluation (yield, lodging, diseases resistance).



Photo 2. Evaluation plots

- Additionally, we conduct regularly a three-year field trials with 70 selected accessions to evaluate basic technological traits: hull content, nutritional values content: starch, protein, fat,  $\beta$ -glucan, dry weight etc.

- Our responsibilities are to complete passport evaluation and photographic database in collaboration with NCPGR (National Centre for Plant Genetic Resources) Laboratory of Documentation and Long Term Storage through regeneration; handing on the panicles of regenerated accessions to the NCPGR reference herbarium.

Work was conducted in the course of task 1.2 (3-1-02-0-13)'Collection and preservation in field collections, in vitro crioconservation, characteristics, evaluation, documentation, sharing of genetic resources and information of agricultural and usable plants, crop wild relatives and companion plants' of Multiannual Programme „Creation of the scientific basis of biological progress and protection of plant genetic resources as a source of innovation and support for balanced agriculture and national food security”.