26th May – 28th May 2010
SWS European Chapter Tramore Meeting

Seed germination of some herbaceous plants suitable for phytoremediation

A. Bassan, P. Sambo and M. Borin
paolo.sambo@unipd.it
Department of Environmental Agronomy and Crop Science, University of Padova, Italy

INTRODUCTION

Herbaceous plants used in phytoremediation systems are generally grown starting from vegetative material since many of those species produce rhizomes or stolons (Pignatti, 2002). Farmers in order to multiply this kind of plants generally use portions of rootstock that are often picked up directly in field. This activity is time-consuming grower and needs to be done in specific periods of the year since vegetal portions are not as available for long time as seeds. Seeds could solve many logistic problems but should present acceptable characteristics for a proper use and management.
The aim of this study was to get basic information on seed germination and seedlings emergence of 16 herbaceous species potentially interesting in phytoremediation.

METHOD

Seeds of *Agropyron repens, Agrostis stolonifera, Canna indica, Carex divisa, Carex flacca, Carex hirta, Carex hordeisticos, Carex pendula, Carex sylvatica, Dactylis glomerata, Iris pseudacorus, Juncus conglomeratus, Lythrum salicaria, Scirpus holoschoenos, Symphytum echinatum, Typha latifolia* were used to perform germination tests and to evaluate the emergence percentage.

Germination test

- 400 seeds/species divided in 4 replication;
- paper as a substrate was used;
- 20°C for 16 hours in dark;
- 25°C for 8 hours with light;
- germinated seeds were daily counted.

Determinations:
- total germinated seeds;
- germination percentage (GP);
- average germination time (AGT);
- average germination speed (AGS).

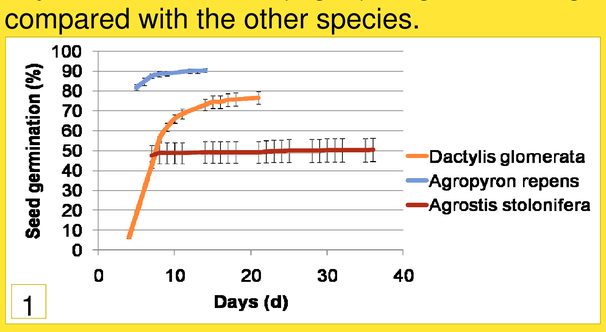
Emergence trial

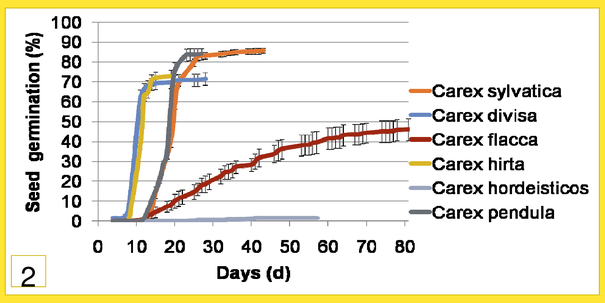
- 126 seeds/species divided in 3 replication;
- polystyrene trays with 84 pot;
- sphagnum peat;
- daily watering;
- emerged seeds were daily counted.

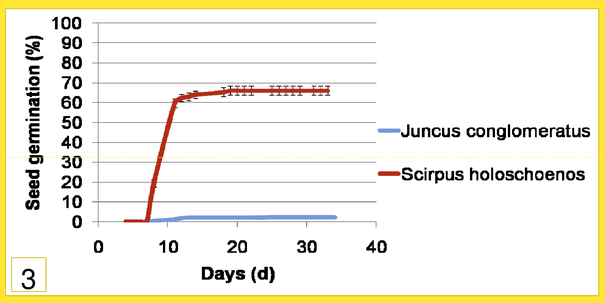
Determinations:
- total emerged seeds;
- emergency percentage (EP).

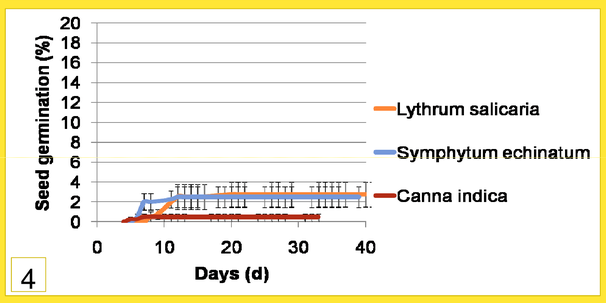
RESULTS AND DISCUSSION

Strong differences among species belonging also to the same botanical family Graminaceae (Fig. 1) and genus Carex (Fig. 2) were probably due to the fact that germination tests were carried out using the same conditions for species which probably need different climatic requirements. AGS is a useful index to evaluate germination uniformity: grasses species and of some Carex (Fig. 5) gave good results if compared to other species.
Excluding species that has not germinated, AGT ranged from 3 days for C*anna indica* to 36 days for *Carex flacca* (Fig. 5). In general the genus *Carex* presented slower germination time as compared with the other species.









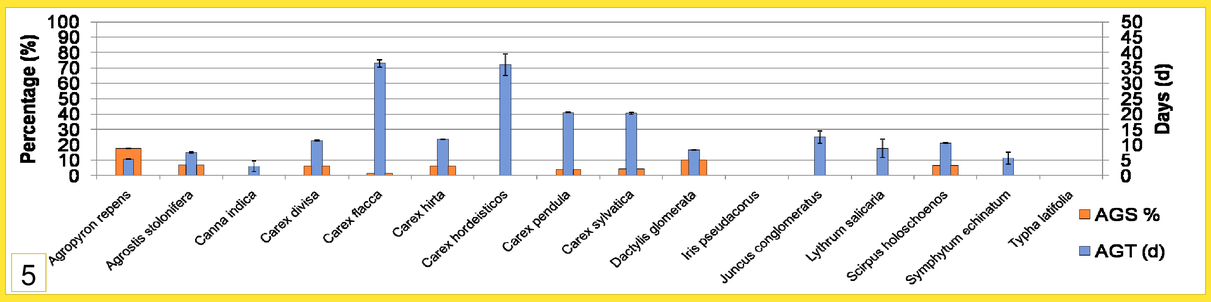


Fig 1, 2, 3 and 4. Seed germination percentage and germination trends.
Fig 5. Average germination time (AGT) and speed (AGS).

Tab.1. Seed emergency percentage.

Species	EP (%)	
Agropyron repens	85,71	± 4.96
Agrostis stolonifera	71,43	± 11.25
Canna indica	16,67	± 4.12
Carex divisa	48,41	± 9.66
Carex flacca	15,87	± 5.56
Carex hirta	88,89	± 5.20
Carex hordeisticos	26,98	± 5.72
Carex pendula	68,25	± 0.79
Carex sylvatica	63,49	± 7,82
Dactylis glomerata	73,81	± 1.37
Iris pseudacorus	0,00	± 0.00
Juncus conglomeratus	65,87	± 3.46
Lythrum salicaria	30,95	± 9.66
Scirpus holoschoenos	7,14	± 0.00
Symphytum echinatum	25,40	± 3.17
Typha latifolia	0,00	± 0.00

Excluding species that has not germinated, emergence experiment confirmed germination data only for *A. repens and D. glomerata*.
C. divisa, C. flacca, C. pendula and C. sylvatica probably prefer lower temperatures condition than those of trial.
Other species have demonstrated better performances respect of germination condition.

CONCLUSION

Species showed strong differences in regularly and fast seed germination. For same species germination was stimulated by the presence of the growing media. Most of the species belonging to the Carex genus showed a very long time of germination and, for *C. flacca*, also a very low germination percentage.

REFERENCES

International Seed Testing Association. 1996. *International rules for seed testing rules 1996.* International Seed Testing Association, Zürich, Switzerland, 155 p.
Pignatti, S. 2002. *Flora d'Italia.* Edagricole, Bologna, Italy.