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Preliminary studies on vegetative propagation on herbaceous plants for phytoremediation purposes

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INTRODUCTION

Many phytoremediation systems with herbaceous plants are realized planting cuttings (Headley and Tunner, 2006) in order to avoid germination problems and also because they are easier to establish. Many species adopted for phytoremediation purposes produce rhizome as underground storage organs (Pignatti, 2002) which are suitable for propagation. Unfortunately, since these species are wild rather than cultivated, rhizomes or other vegetative material for the propagation are not easily available and very expensive. For this reason, many growers collect rhizomes directly in the wild during winter and store them in good climatic conditions until use (ARSIA, 2004).
There is a lack of information about the more suitable plant material for propagation of these species and also about the proper time of the year for their collection. Thus the aim of this study is to evaluate the ability of establishment and growth from rhizome of three herbaceous species in order to obtain useful information to create stock plant material for a massive propagation of these species.

METHOD

PRELIMINARY OPERATIONS:

- Rhizomes of *Arundo donax*, *Iris pseudacorus* and *Typha latifolia* were collected in the wild during spring 2009.
- Rhizomes were divided in portion with length of about 70 mm in *A. donax*, 50 mm in *I. pseudacorus* and of 5 internodes in *T. latifolia*.
- 30 rhizome cuttings per species were transplanted in pots (ø 280 mm,15L) filled with sphagnum peat and regularly watered and fertilized.


Fig. 1. Portions of rhizome of *A. donax in pot.*


Fig. 2. Portions of rhizomes of *I. pseudacorus in pot.*


Fig. 3. Portions of rhizome portions of *T. latifolia.*


Fig. 4. Portions of rhizome of *T. latifolia in pot.*

DATA COLLECTED

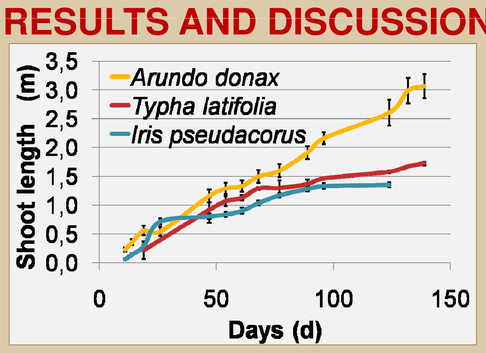
During growing season:

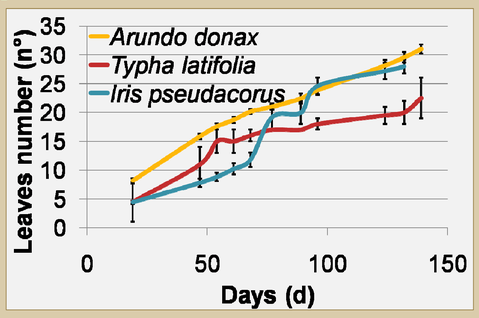
- main shoot height;
- main shoot leaf number
- main shoot diameter.

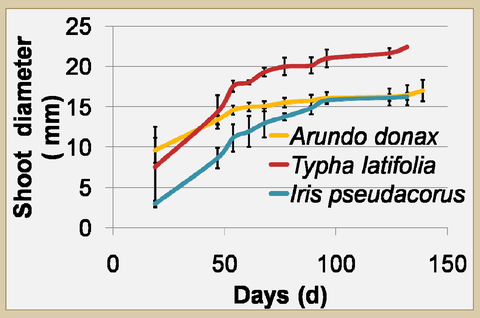
At the end of the experiment:

- established rhizomes;
- total number of leaves per rhizome;
- average shoot diameter per rhizomes;
- total shoots number per rhizome;
- average rhizomes length;
- root mass weight.

RESULTS AND DISCUSSION







Evolution of length (Fig. 5), leaf number (Fig. 6) and diameter (Fig. 7) of the main stem over time.

Tab 1. Determinations at the end of the experiment.

Species	Established rhizomes (%)		Total leaf number per rhizome (n°)		Shoot diameter (mm)		Shoot number per rhizome (n°)		Rhizomes length (m)		Root mass weight (g)	
Arundo donax	46.7	± 2.4	125	± 18.8	12.8	± 0.68	6.7	± 1.04	0.53	± 0.05	912	± 150
Iris pseudacorus	96.0	± 4.0	80.9	± 11.3	15.2	± 3.05	2.4	± 0.21	0.14	± 0.01	391	± 23
Typha latifolia	6.67	± 4.2	280	± 1.0	18.2	± 1.10	18.0	± 0.90	5.48	± 0.49	1375	± 73

Plant height and leaf number of *A. donax* (Fig. 5 and 6) increased continuously during the experiment. In *I. pseudacorus* and *T. latifolia* shoot height increased quickly, early in the season, and then it slowed down while leaf become mature. The diameter of the main shoot increased mostly in the first 50 days for *A. donax* and *T. latifolia* while for *I. pseudacorus* increased the main shoot more regularly throughout the season (Fig. 7).
Plant establishment from rhizome had different success in the three species (Tab. 1). A very high rhizome death was observed in *T. latifolia*, and a very low in *I. pseudacorus*. On the contrary, aerial and root plant growth was higher in *T. latifolia* and lower in *I. pseudacorus* as highlighted by the number of shoots and leaves that each plant produced. *A. donax* had intermediate results.

CONCLUSION

The three species demonstrated to grow sufficiently fast from rhizome when cultivated in controlled condition in order to create stock plants for propagation purposes. Some differences were observed among species which, of course, are due to their different characteristics.
Spring rhizome cutting of *Iris pseudacorus* established easily while those of *Arundo donax* had some difficulties. Spring propagation by rhizome cuttings appears not suitable for *Typha latifolia* which had a good growth but e very little percentage of establishment.
Further studies are necessary to identify the best period of time for rhizome propagation of *Arundo donax* and *Typha latifolia*.

REFERENCES

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