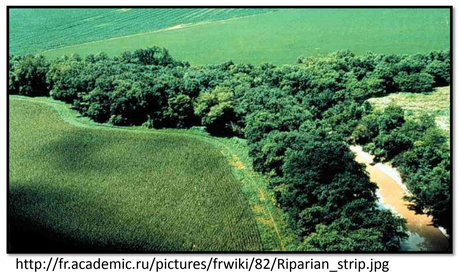


http://fr.academic.ru/pictures/frwiki/82/Riparian_strip.jpg

Diversification of agricultural riparian buffers with indigenous shrubs species

Élise Larivière[1], Monique Poulin[1]* and Anne Vanasse[1]

1 Département de phytologie, Université Laval, Québec, QC, Canada

* Corresponding author : Monique Poulin (email: Monique.Poulin@fsaa.ulaval.ca)

CENTRE DE LA SCIENCE DE LA BIODIVERSITÉ DU QUÉBEC
QUEBEC CENTRE FOR BIODIVERSITY SCIENCE

CENTRE D'ÉTUDES NORDIQUES
CEN Centre for Northern Studies

UNIVERSITÉ LAVAL

Introduction

- In addition to bank stabilization, agricultural riparian buffers may impact on local fauna and flora by diversifying the landscapes.
- In Québec, the riparian management initiatives are actually limited to the use of a low diversity of species that are well-known for their ability to stabilize the banks. However this approach generates little biodiversity on a watershed scale.
- The objective of the present study was to assess the establishment potential of new indigenous shrub species.

Materials and Methods

Study site

- Shrubs were planted on the terraces and slopes of streams crossing agricultural fields in three areas of Québec: Bas St-Laurent, Montérégie and Portneuf.

Tested species

- In each position, 4 new species were present as well as a frequently used one (control) (Fig.1 and 2).

Sampling

- Observations were realized twice (spring and fall) in each year (2009 and 2010).
- Variables observed were :
  - initial rooting quality
  - growth (height and crown diameters)
  - physical condition scores (breaks, necrosis and insect defoliation)
  - general health score
  - competition

Analysis

- Mixed ANOVA (Fisher protected test) followed by a two by two comparison test (T test).

Results and Discussion

Terrace

- *S. alba* showed the greater performances in all three areas with a 100% survival, an elongation rate as well as a general health rate higher than the other species and a lower frequency of breaks and necrosis (not shown).
- After two growing seasons, *S. canadensis* showed the lowest survival rate (88%) and had lower performances than the control for growth and general health parameters (Fig. 3).
- In Portneuf, *C. cornuta* and *R. blanda* were also given lower scores for the health parameter (Fig. 3b).
- Sprouting potential of the species tested is an important element to consider. A ploughed strip next to the riparian buffer could help to prevent undesired propagation in the fields.

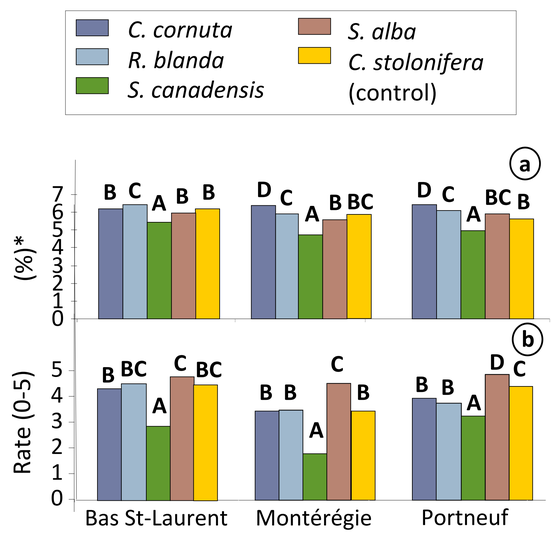


Fig. 3 : a) growth (fall 2010) transformed data log (x+100) are presented and b) general health parameters for terrace species

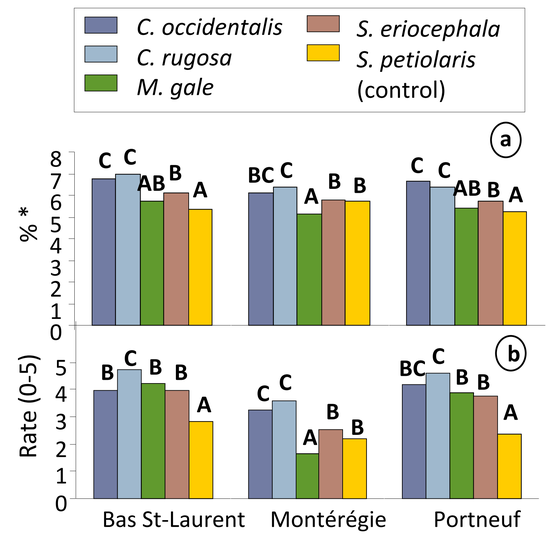
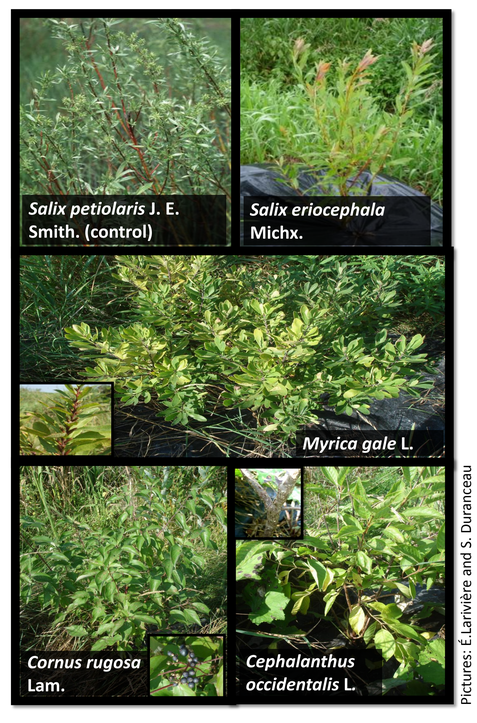


Fig. 4 : a) growth (fall 2010) transformed data log (x+100) are presented and b) general health parameters for slope species

Pictures: É.Larivière and S. Duranceau

Fig. 1: species transplanted on terraces in spring 2009

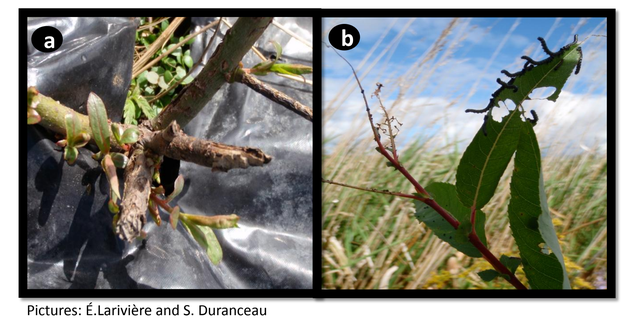


Pictures: É.Larivière and S. Duranceau

Fig. 2: species transplanted on slopes in spring 2009

Slope

- All the tested species had a survival rate over 85% and performed better or as well as the control with regards to growth and general health parameters except for *M. gale* in Montérégie (77% survival) (Fig. 4).
- Low soil humidity seems the most plausible explanation for *M. gale* mortality. It could have been prevented by a plantation lower in the slope and by avoiding sandy soils.
- Defoliation and breaks were mainly observed on the *Salix* species (Fig. 5). However, they showed a great recovering capacity since their growth performance was comparable to the others.



Pictures: É.Larivière and S. Duranceau

Fig. 5 : Examples of a) breaks and b) defoliation for the two *Salix* species

Initial rooting quality and competition

- Variations observed in the initial rooting quality of the plants as well as different levels of invasion by competing species do not seem to be related to the survival or the health parameter.

Conclusion

- With the 4 additional shrubs species currently studied (*Physocarpus opulifolius* (L.) Maxim., *Amelanchier alnifolia* Nutt., *Ilex verticillata* (L.) A. Gray and *Viburnum cassinoides* L.), a total of 12 indigenous shrubs species, evaluated in agricultural environment, will be available for diversifying riparian buffers.
- Since a greater richness is associated to buffers containing ligneous species (Boutin et al., 2003), including those species in agricultural riparian buffers will surely have a positive impact with regard to biodiversity.
- The large geographical range of the study enables generalization of the results to the area of high agricultural activities of the Saint-Lawrence Lowlands and the Appalachian Low Plateau.

Acknowledgements

- A. Brégard, S. Duranceau and S. Lamoureux
- Conseil pour le développement de l'agriculture du Québec (CDAQ) and Agriculture and Agri-Food Canada (AAFC)

References

- Boutin, C., B. Jobin and L. Bélanger. 2003. Importance of riparian habitats to flora conservation in farming landscapes of southern Québec, Canada. Agriculture, Ecosystems and Environment 94: 73-87.