

# Effects of wind-breaks and forest borders on the abundance and diversity of native pollinators in lowbush blueberry

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## Introduction

In Quebec, wind-breaks are inherent components of blueberry fields where they play an important role in maintaining snow cover during winter to prevent the plants from freezing. Hedgerows and forest borders provide nest sites and floral resources for wild pollinators and can therefore influence their abundance and diversity in agricultural landscapes (Goulson, 2003; Kremen *et al*, 2004). For instance, Chacoff and Aizen (2006) found that the abundance of native pollinators was higher close to forest borders and lower within the crop field, preventing efficient pollination of the crop. Better understanding of pollinators dynamics in blueberry fields is therefore of great interest for enhancing pollination services.

## Objective

Evaluate whether different types of wind-breaks and forest borders influence pollinators' abundance and diversity in lowbush blueberries *Vaccinium angustifolium* L. (Ericaceae)

## Methods

- Four treatments were compared:
- 1) Wind-break 1 row of trees (WB1)
  - 2) Wind-break 2 rows of trees (WB2)
  - 3) Natural wind-break (NWB)
  - 4) Forest border (FB)

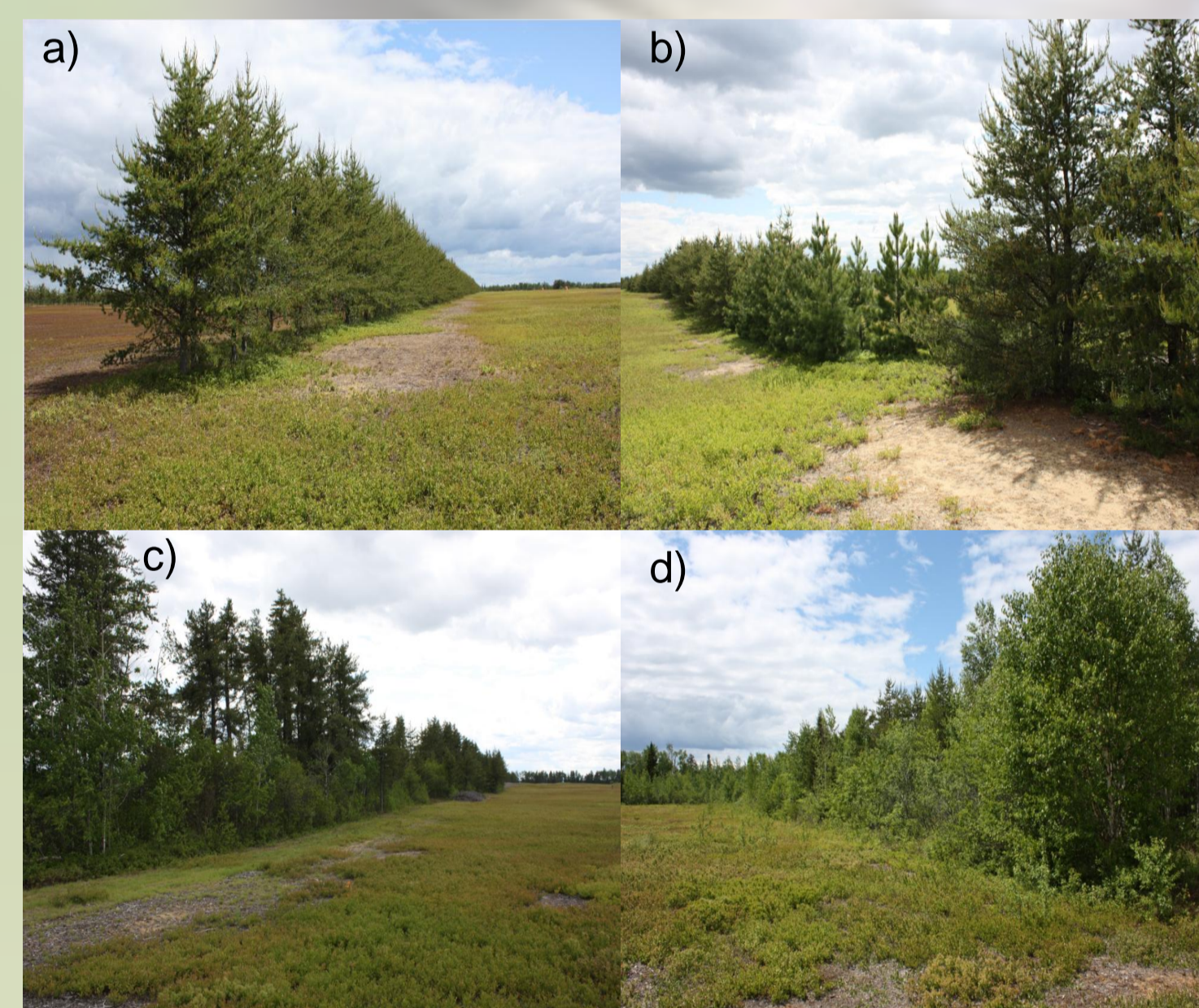


Fig.1 The 4 different treatments: a) WB1, b) WB2, c) NWB and d) FB

Wind-breaks are generally constituted of Jack Pine (*Pinus Banksiana*) and *Kalmia angustifolia* is normally present in the understory.

Study sites were located in Lac-St-Jean region, Qc.

Four repetitions of each treatment

- Two transects
- 9 pan-traps/transect
- Three distances from the wind-break or forest border: 5m, 30m and 60m

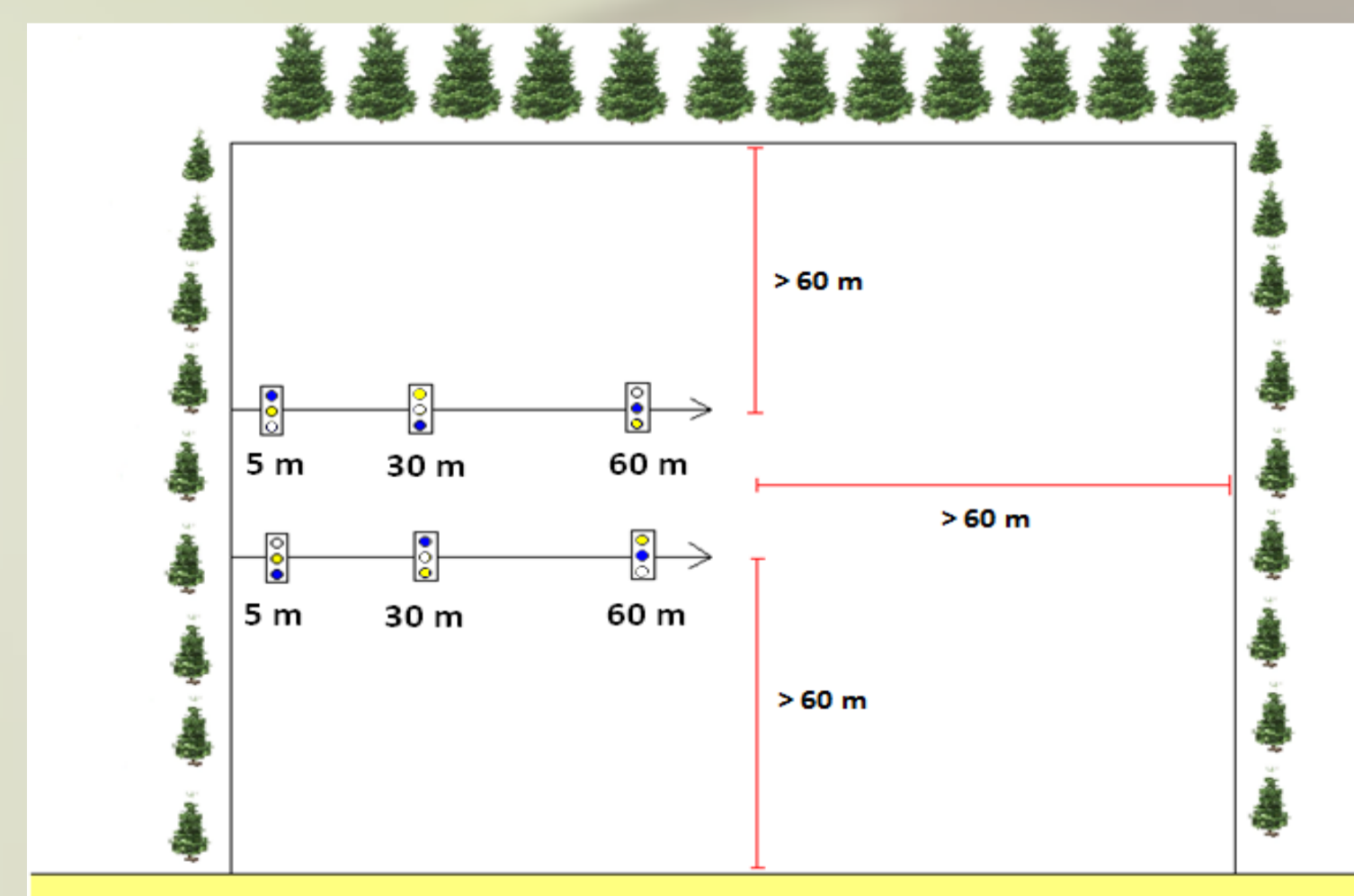


Fig.2 Diagram presenting collection method

Traps were emptied every three days throughout *V. Angustifolium* blooming (May 26<sup>th</sup> to June 6<sup>th</sup>, 2010)

Specimen (=Hymenopterans and Dipterans pollinators) will be identified to the lowest taxon possible. Today we present results relative to the abundance of pollinators.

## Results

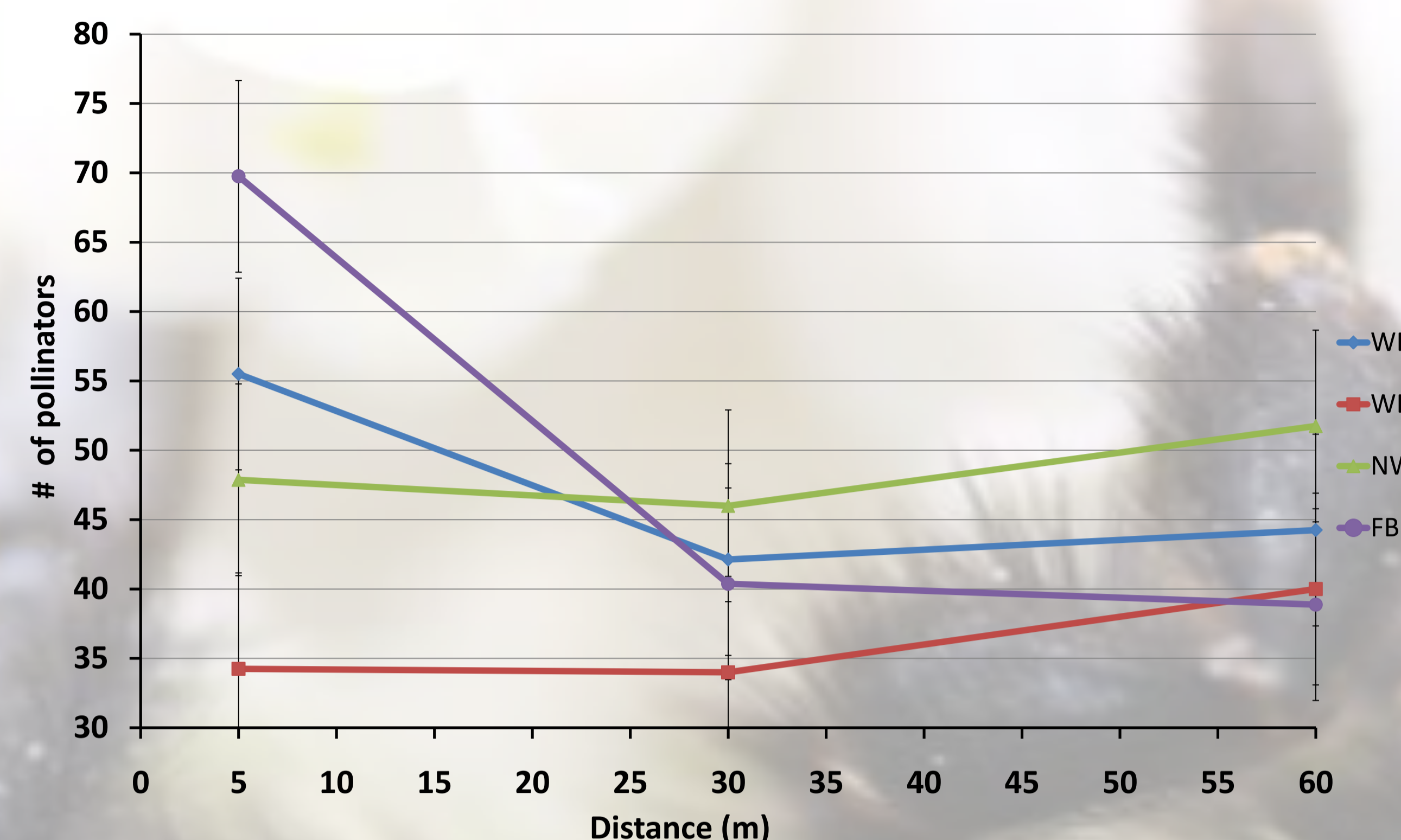


Fig.3 Pollinators' abundance in relation with distance from the ecotone for 4 treatments

- A total of 4350 specimens were captured
- There was no influence of the distance on pollinator abundance for wind-breaks. However, for forest borders, abundance decreased by half between 5 m and 30 m and remained stable at 60 m  $F=21.28$ ,  $p < .0001$ .

- Most pollinators were ground-nesters (73,7%)

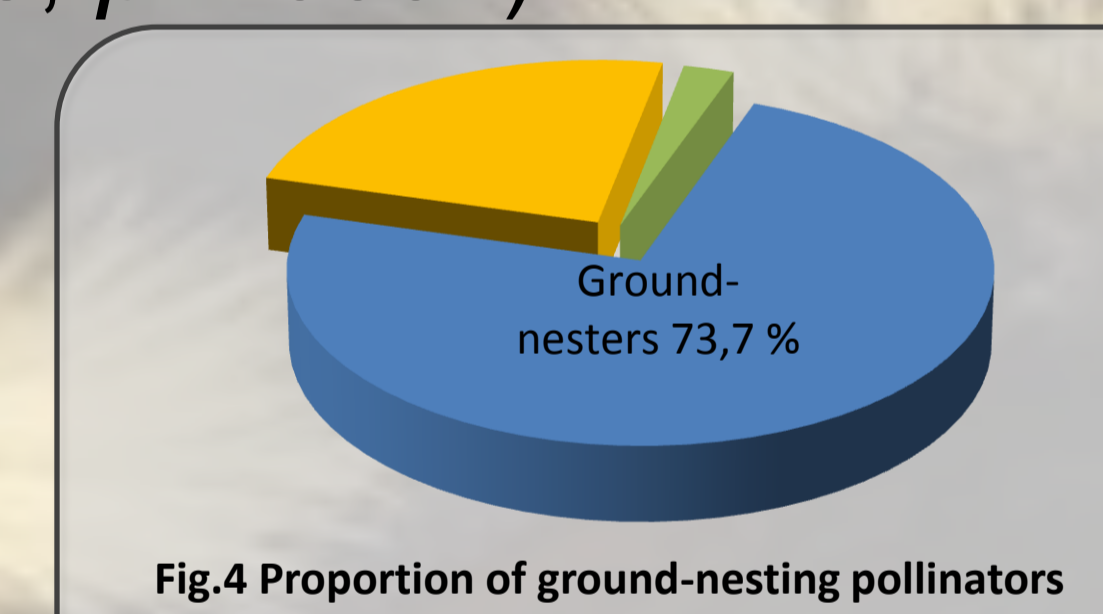


Fig.4 Proportion of ground-nesting pollinators

## Results

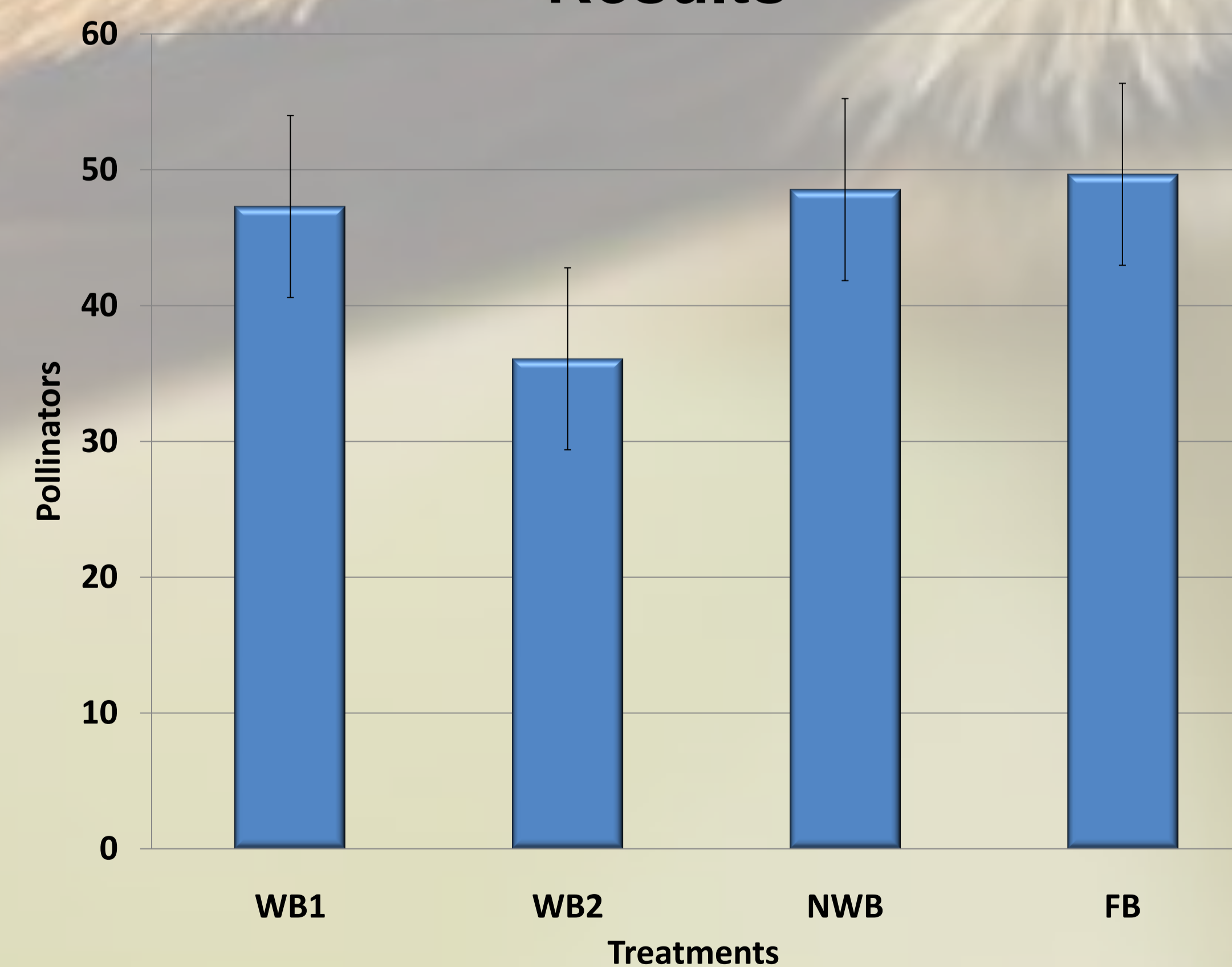


Fig.5 Average number of pollinators per treatments

The average number of pollinators was ~25% lower for WB2 treatment compared to the others. However, this was not statistically different ( $F=1.03$ ,  $p=0.4135$ ).

## Discussion

The different types of wind-breaks (WB1, WB2 and NWB) do not seem to influence pollinators' abundance.

The only treatment where the distance from an ecotone influenced pollinators' abundance was the forest border (FB).

This greater abundance close to the forest border may be explained by a larger number of nesting sites and nutritional resources for pollinators.

The short flying capacity of small pollinators which may be nesting and feeding close to/in the forest borders may explain why pollinators are more abundant only in the first few meters of the field.

The majority of bees found in Quebec are nesting underground (Payette, 2003) and the specific type of sandy soil found in blueberry fields is particularly suitable for ground-nesters. The fact that most pollinators (bees) are ground-nesters that may not require trees proximity for nesting might explain why we sampled low numbers around wind-breaks.

The first 2-3 meters around wind-breaks are often used as road for machinery by farmers, it may compact soil and make it harder for pollinators to nest.

*V. angustifolium* plants close to wind-break were often smaller and sparser than the ones  $\geq 5$  m inside the field, supplying therefore less resources to pollinators.

## What's next?

- Identification of specimens to the lowest taxon possible
- Analysis of pollinator diversity in relation with distance
- Identification of pollen load found on specimens collected in 2009 (Year 1 of the project)

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