

# Wind erosion processes and related glyphosate transport in the loess pampean region of Córdoba province, Argentina

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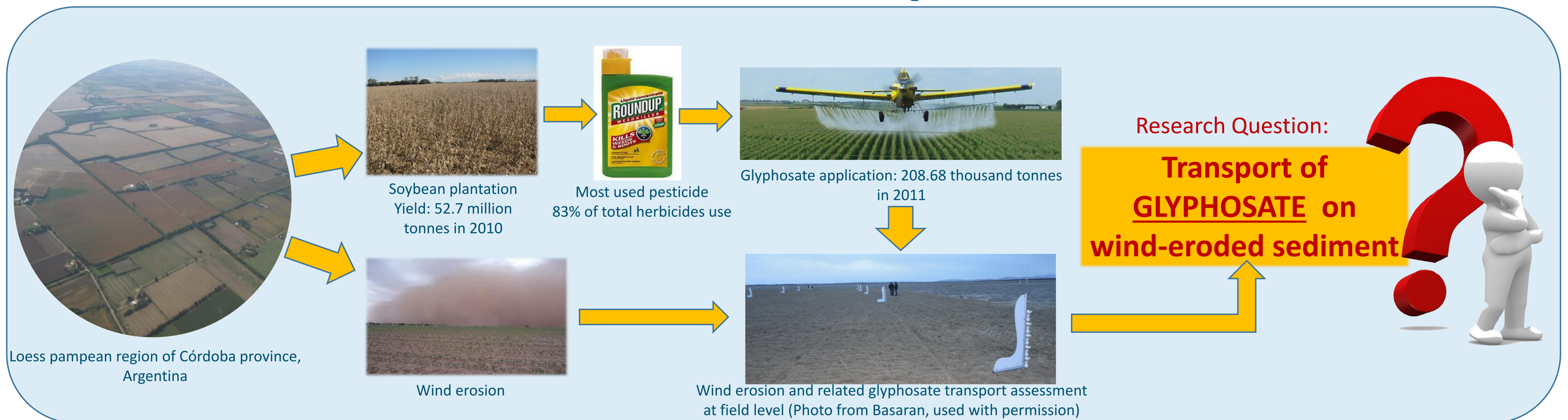
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## Introduction and Objective



## Materials and Methods

### Site description

#### Córdoba Province, Argentina

- Loess soil: silt loam soil
  - Sand: 16%; Silt: 69%; Clay: 15%
  - Organic matter: 3.6%
- Main crops: soybean, maize, wheat
- Glyphosate is typically applied the entire year
- Average Maximum Annual Wind Speed: 16 Km/h (but can reach peaks of 70 Km/h)
- Dominant Wind Direction: North-Northeast (NNE)
- Average Annual Temperature (2005-2012): 16.5°C
- Average Annual rainfall (1931-2010): 757 mm

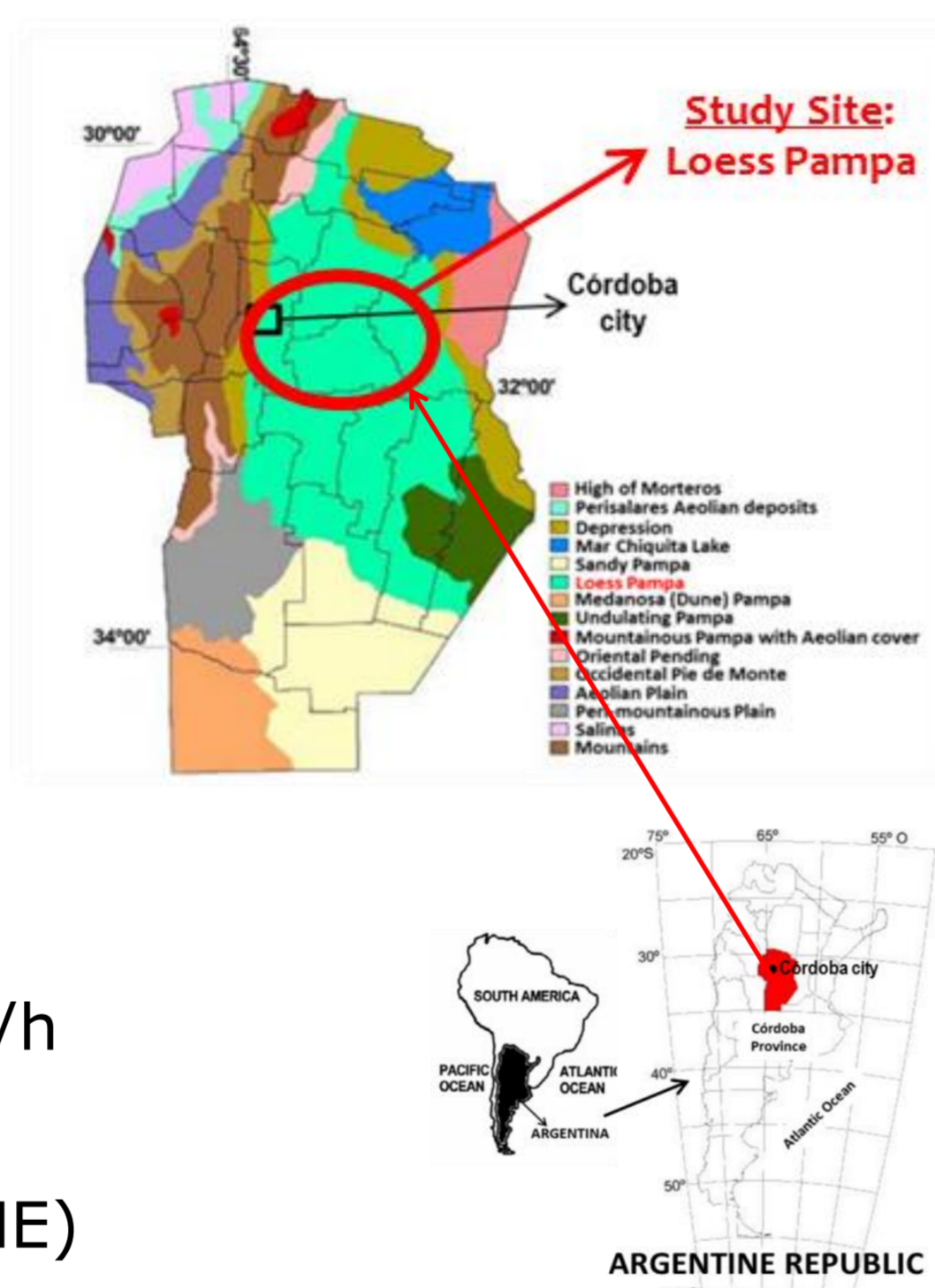


Figure 1. Study Site Location.

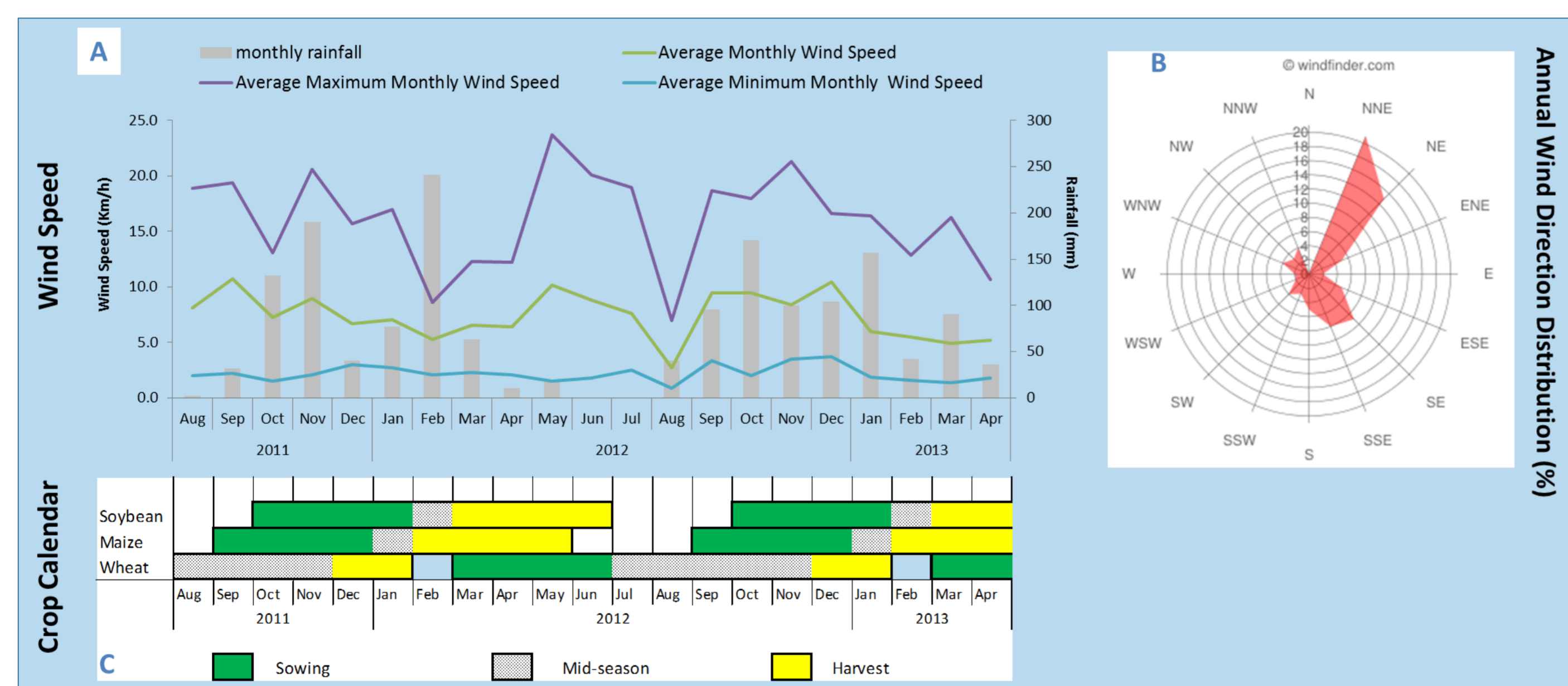


Figure 2. Monthly Wind Speed (average minimum, average, average maximum) (A), Annual Wind Direction Distribution (%) (B), and Crop Calendar for the main produced crops (C) in Córdoba province, Argentina. (Sources: A – adapted from Lovera *et al.*, 2013; B – Windfinder, 2013)

### Expected outcome

The results of this experiment will provide:

- Insight on glyphosate and AMPA concentrations in wind-eroded sediment;
- Valuable information on the losses of glyphosate and AMPA to off-site environments due to wind erosion;
- A strong contribution to the Argentinean decision makers, stakeholders and the international community in the knowledge of glyphosate/AMPA transport by wind erosion, and its potential impact to the environment and human health.

### DESIGN SETUP

- Soil conditions to be tested (in triplicate):
  - Ploughed bare soil
  - Non-till bare soil
  - Non-till soil under soybeans growing crop conditions
- Plots surrounded by a non-erodible surface (e.g. standing stubble, weeds)
- Control plots of 5x5m (in triplicate) → glyphosate and AMPA decay control
- Glyphosate application: according to farmers periodicity and rate
- Glyphosate/AMPA analysis on wind-eroded sediment and soil samples

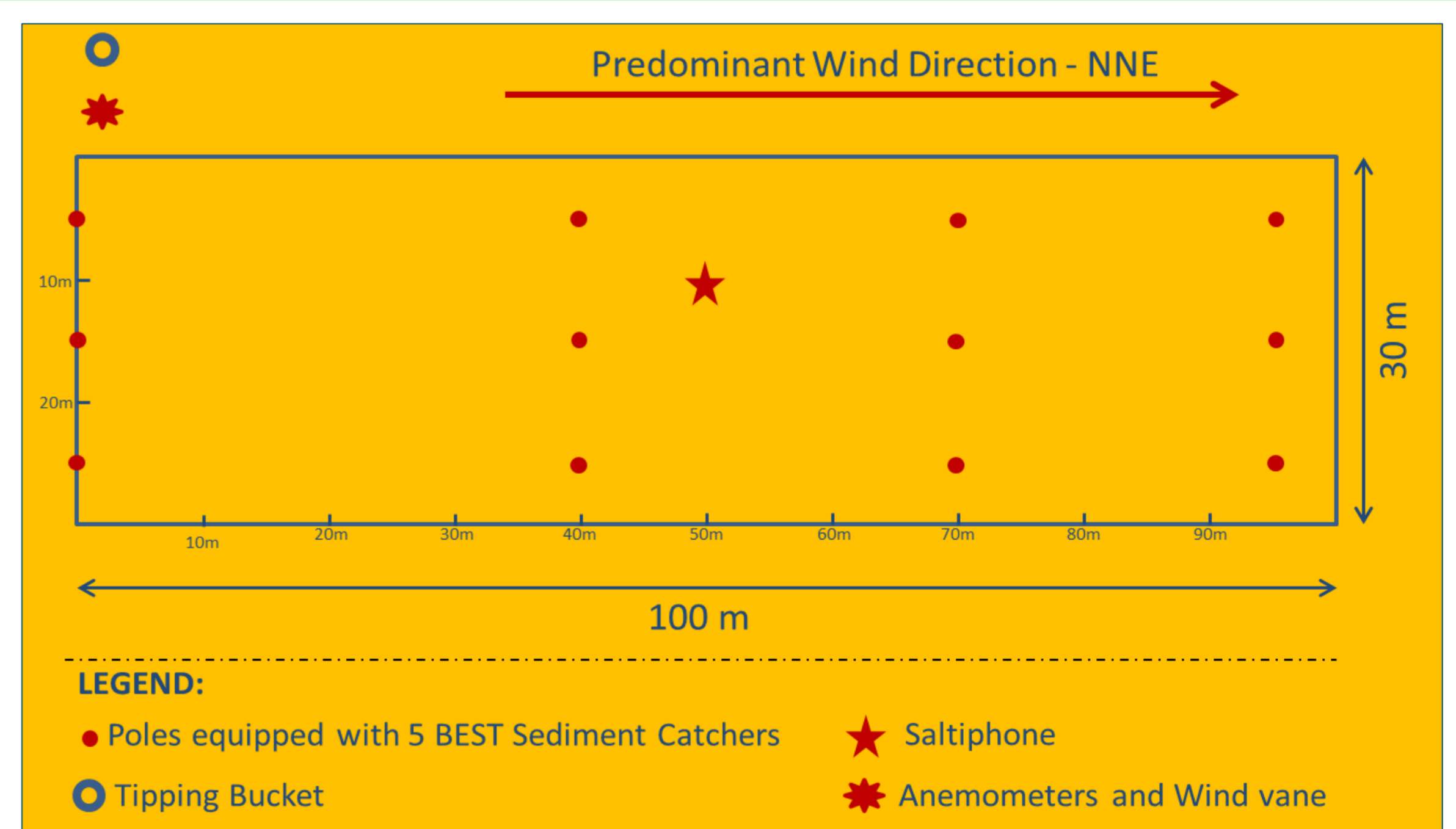


Figure 4. Design setup for the assessment of glyphosate and AMPA transport by wind erosion, to be held in the Experimental Station of INTA-Manfredi, in Córdoba, Argentina.

- 12 poles / plot → rotation limited to the predominant wind direction
- 5 sediment catchers BEST / pole

**Heights:**  
10cm, 20cm, 40cm, 60cm and 100cm



Figure 3. Sediment catcher BEST (Source: Basaran *et al.*, 2011)

- 1 meteo-station equipped with:
  - 1 wind vane → for wind direction measurements
  - 5 anemometers at: 1m, 2m, 3m, 4m and 5m → for wind speed measurements

## Suggestions ?

### Cited Literature

- Basaran, M., Erpul, G., Uzun, O., Gabriels, D., 2011. Comparative efficiency testing for newly designed cyclone type sediment trap for wind erosion measurements. *Geomorphology*. 130, 343-351.
- Lovera, E. F., Alvarez, C., Severina, I., 2013. Información meteorológica mensual de la E.E.A. Manfredi. INTA – Instituto Nacional de Tecnología Agropecuaria.
- Windfinder, 2013. Wind & weather statistics Córdoba Aeropuerto. Available at [http://www.windfinder.com/windstats/windstatistic\\_cordoba.htm](http://www.windfinder.com/windstats/windstatistic_cordoba.htm).