

# Developing selection criteria for breeding organic nitrogen-efficient potato (*Solanum tuberosum*) varieties

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**Introduction** The most yield reducing factors in organic potato growing are late blight infestation and nitrogen deficiency. Therefore, organic potato growers need varieties that are resistant to late blight and nitrogen efficient. Breeders and organic farmers experience large genotypic variation in the response to low levels of nitrogen. But the physiological mechanisms explaining these differences and the genetic background are unknown.

**Aim of the project (2008-2011)** The aim of the project is to design selection criteria for nitrogen use efficiency (NUE) under low nitrogen conditions.

**Material and methods** The project started in 2008 with the identification of morphological plant traits that are correlated with NUE. A field experiment is conducted at an organic and a conventional location, with nine varieties (Agate, Leoni, Biogold, Santé, Bionica, Fontane, Terragold, Agria and Spirit) and three nitrogen levels (90, 150 and 300 kg N/ha) in four replicates (split plot design).

The soil cover is assessed twice a week, whereas leaf area, tuber bulking and nitrogen accumulation in haulm and tubers are measured over time by intermediate harvests. We expect to find some parameters (a to d; see figure 1) in the soil cover curve that are correlated with NUE.

The next step is to translate the most promising traits into simple and easily applicable selection criteria.



Planting the tubers



Assessment soil cover

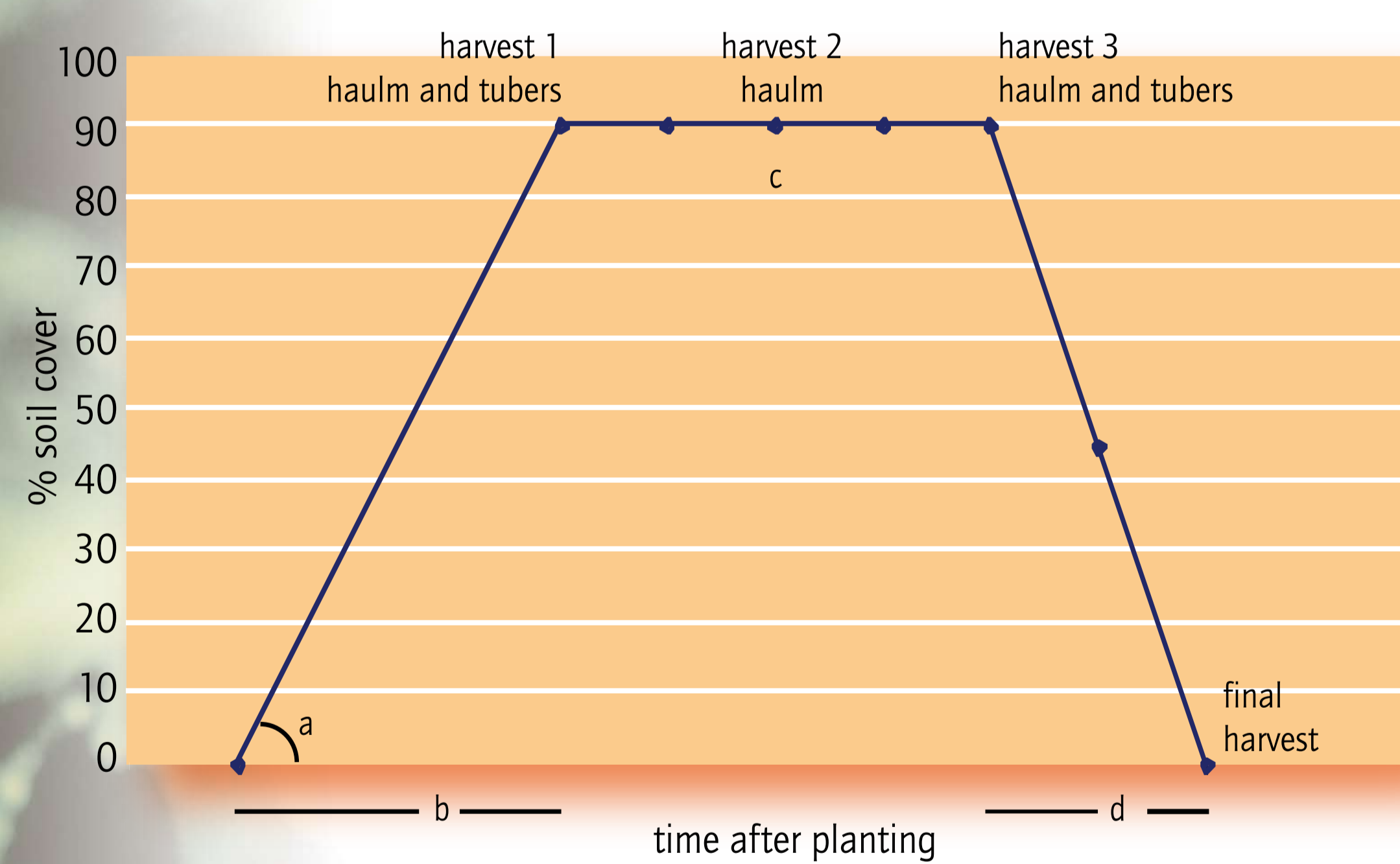


Figure 1. Soil cover curve with the parameters a, b, c and d and time of intermediate harvests.

a = rate of soil cover (%/day);

b = time to reach maximum soil cover;

c = length of period with maximum soil cover;

d = time from maximum soil cover to haulm death.

**Preliminary results** The tubers were planted on April 22nd. The first intermediate harvest was on June 18th, 57 days after planting (DAP). The preliminary results of the dry matter content of the tubers of the first harvest show a nitrogen level X variety interaction (figure 2).

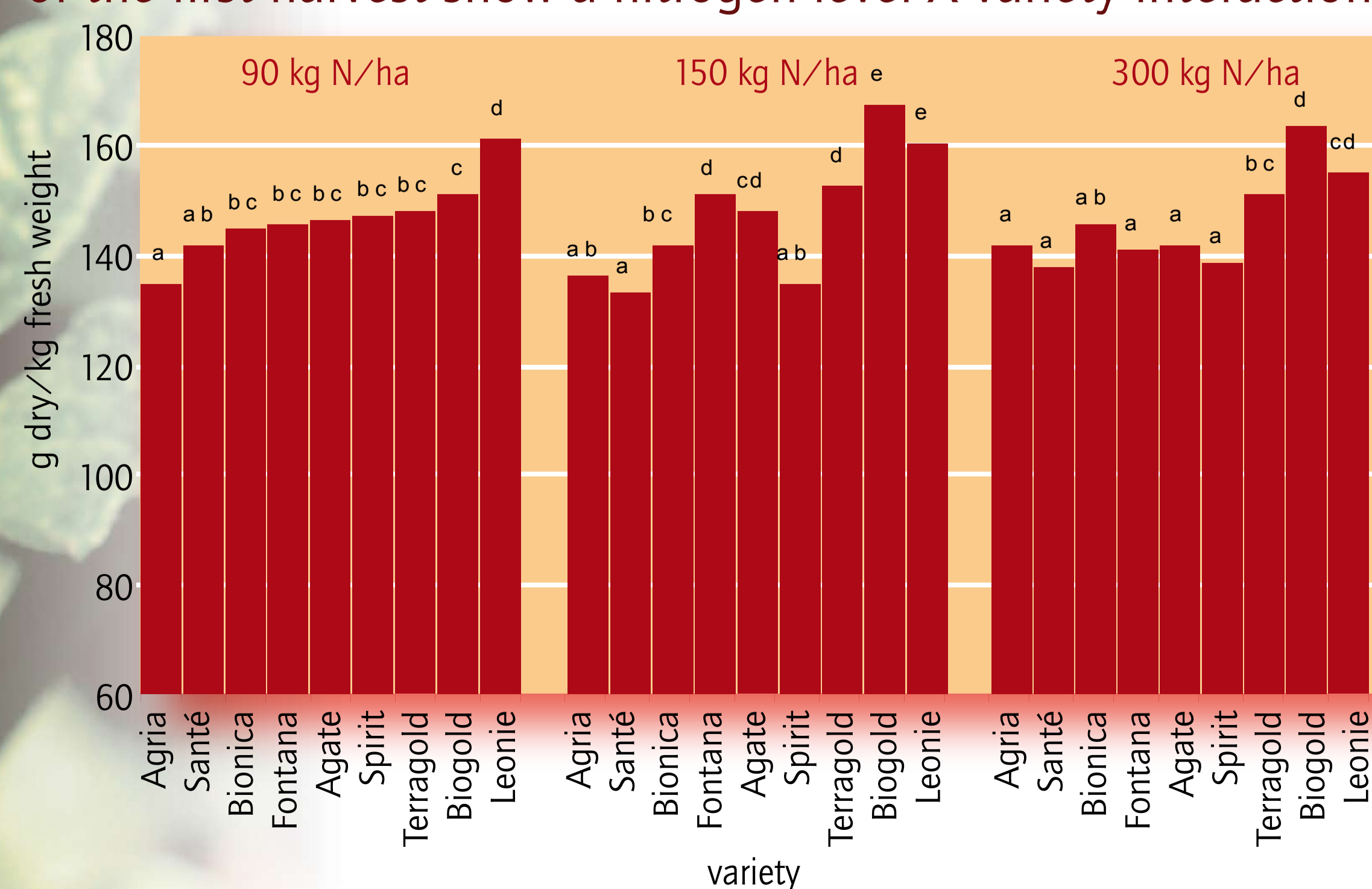


Figure 2. Dry matter content of the tubers at the first intermediate harvest (57 DAP) at the organic location.

Lsd within the same nitrogen level is 8,55 (P=0,002). Columns within the same nitrogen level with the same letter do not differ.