

## **Pomological characterization of Carob tree (*Ceratonia siliqua* L.) from the Province of Sefrou, Middle Atlas of Morocco**

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### **Abstract**

Forty five Sefrou carob populations from three sites were studied to assess their genetic variation based on pod and seed measures. Locust beans were characterised by: length, width, thickness, chord, weight, number and weight of seeds, aborted seeds rate and seeds yield in addition to the twist coefficient. For seeds, we measured the length, width, the ratio "width/length", the thickness, the ratio "width/thickness", the weight and the yields of the various parts of the seed i.e., the endosperm, the embryo-cotyledons and the tegument. The results showed that the chord, the weight and the yields of seeds and pulp of the carob pod, and the seed weight allow a better discrimination between the three surveyed locations. However, there were no differences between the three localities regarding the width and thickness of the carob pod, and the seed tegument yield. Generally, the intra-locations changes show a very highly significant difference between the trees of each location for all the parameters studied. These results show that environmental conditions do not explain alone the variation in pomological parameters followed and thereby there would be probably a genotypic variability within each locality.

**Keywords:** Pomological characterization, Carob tree, Carob pod, Carob seed, *Ceratonia siliqua* L., Sefrou, Morocco.

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### **Introduction**

The carob tree (*Ceratonia siliqua* L., *Fabaceae*) has an increasingly socio-economic and ecological interest in the world seeing various socioeconomic uses of gum extracted from the carob seed, flour obtained from locust bean (food, pharmaceutical, film, textile, cosmetics...) and carob tree in reforestation against desertification and soil erosion (Correia & Martins-Loucao, 2005). Originally from the Middle East and the Southwestern Asia, its distribution currently covers the five continents, particularly under the Mediterranean climate (Northern Africa,

Middle East, Southern Europe, Canary Islands and more recently in Australia, Southern Africa, the USA, India and Southern America) (Tous *et al.*, 1996; Battle & Tous, 1997; Yousif & Alghzawi, 2000; Gharnit & Ennabili, 2016).

The annual world production of carob bean is about 315,000 tons produced from approximately 200,000 hectares with variable yields depending on the cultivar, region, and agricultural practices (Makris and Kefalas, 2004). The main producers of carob bean and seed are Spain (36%-28%), Morocco (24-38), Italy (10-8), Portugal