

ABSTRACT

The cultivation of *Jatropha curcas* L. is an alternative renewable energy source. Being limited to warm areas, existing research on its exploitation does not provide enough information for us to have complete knowledge about its farming, so that it is still an undomesticated species today.

The main objective in this dissertation is to study the influence of certain agroecological factors in dry subtropical climates that affect the seed weight yield of *J. curcas*. A multifactorial experimental design was defined under arid conditions in the southwestern area of the Dominican Republic, measuring the response of 2 varieties given 2 levels of fertilization, furrow depth, weeding and planting space, the combination of which defined the treatments tested. In order to apply this design, 96 experimental squares of 400 m² each were conditioned.

The variability observed in the obtained yields indicates that productivity responded to the adopted factors. The highest values (760 kg/ha) were recorded for the variety Cabo Verde, under a high frequency of weeding, smaller planting space (2,5x3 m), furrow formation (30 cm high) and higher fertilizer dose (150 kg/ha). The vegetative and phenological development of the crop was strongly influenced by the water intake that is characteristic of the wet period. The microclimatic data recorded in the experimental field were similar to the historical data collected at the nearest town.

The propagation capacity of *J. curcas* is verified, high survival rates having been obtained in both reproduction by seed (90%) and by stem (100%). In the latter case, the application of auxin (IBA) led to greater root development, which became more evident at higher doses (5 mg/L).

The removal of the components of weed vegetation in crop fields constitute a costly portion of the operating programs. Therefore, a section is dedicated to this subecosystem, making a phytosociological study based on inventory sampling and calculation of synthetic indices. Four distinct associations were defined according to the dichotomous classifications obtained, reflecting the ecological affinities between the referred species, of which a floristic catalogue was made. As seen at the end of the document, other taxonomically determined species are appended, as part of the natural flora.

Pests and diseases as an agricultural subecosystem had no significant effect on crop yield. In the case of the former, although the control of mites was the most difficult aspect, the genera *Pachycoris* sp. and *Naupactus* sp. stand out because of their widespread distribution throughout the whole cycle. Damage caused by fungi is limited to the period with the highest humidity.

Another studied objective is CO₂ fixation by the crop. It was determined that the sink capacity of *J. curcas* (one year and a half old) for this gas is about 4 t CO₂/ha. Compared to the most representative species of natural vegetation *P. juliflora*, results indicate that for the chosen area, both could fix similar amounts for an equal surface.

The research concludes with a section devoted to the characterization of the seed's oil. Both its contents and the observed physicochemical parameters (chemical composition, volatile content, fixed carbon and ash, and calorific value) showed similar values for samples from different varieties, field yields and plantation age.

The cultivation was viable. However, it is unlikely that similar yields may be achieved without irrigation as those obtained in areas with more humid climates, something that contributes to highlighting the importance of considering the agroecological environment. For an optimal and profitable exploitation, the quality of the plant material and the farming tasks should be considered, as reflected by the effect of the studied factors on yield.

The obtained results open paths to continue this avenue of research and to make further studies about the impact of the adopted factors, the evolution of weed flora in response to human activity, and the increase in the plant's primary productivity, among other aspects.

Keywords: oil, semiarid climate, weed, CO₂ fixation, *Jatropha curcas*, experimental field, propagation, yield.