

Evaluation of Salt and Water Stress Tolerance of Oil Seed Crops

Dr. S. Miyamoto, Dr. G. Niu and I. Martinez, Texas A&M AgriLife Research
Dr. M. Foster, Texas A&M AgriLife Research & Extension Center at Pecos
Dr. C. Trostle, Texas A&M AgriLife Research & Extension Center at Lubbock

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BACKGROUND

There is an increasing need to produce renewable energy throughout the world. Some oilseed crops, such as Safflower, Canola, Camelina, Salicornia, Jatropha and Lesquerella hold potential to provide bioenergy and/or lubricants to improve fuel efficiency. Previous studies have shown that the majority of these crops, except for lesquerella, are highly salt tolerant once established. This trait provides an opportunity to grow these crops in saline areas without competing with food production. However, exploratory trials conducted in the Southwest U.S. indicate that there are some difficulties with crop establishment.

APPROACH

The first phase of this research program is to evaluate salt and water stress effects on seed germination in the laboratory. Seed germination experiments using petri-dishes (photo 1) are in progress. The second phase is to evaluate salt and water stress effects on seedling establishment. This activity is being initiated in AgriLife Research Center greenhouse at El Paso using several different soils from Far West Texas. We are also evaluating water stress effects on growth of salicornia (photo 2) using two types of water; nonsaline (Tap water - 700 ppm dissolved salts) and saline (150 me NaCl - 8700 ppm). The project is assisted by students from the University of Texas at El Paso.

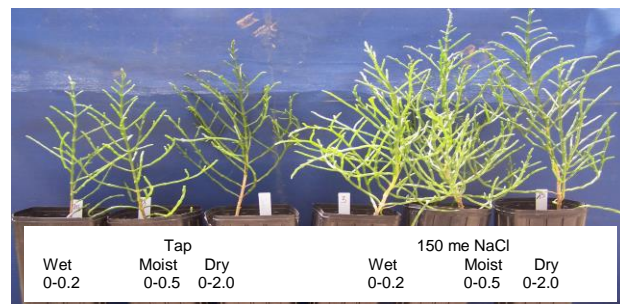
BENEFITS EXPECTED

The primary benefit of the current research is to help identify oilseed crops suitable for cultivation in saline areas. An additional benefit of the ongoing research is to determine if seed germination is limiting crop establishment or hypocotyl mortality (death of seedling stem found below the seed leaves) is the cause. This question needs to be answered for developing procedures for salt tolerance evaluation and improved salinity management for oilseed crop establishment.

This research on water stress tolerance of salicornia is especially significant. This plant species is native to estuaries and for this reason, it can tolerate salinity up to sea water. However, it is generally considered that it requires a lot of water and wet soils. Knowledge of plant physiology points to the possibility that this plant species can actually be drought-tolerant as the plant takes in salts, more water is taken up to dilute salt concentration inside root tissue. Particular significance is that if this hypothesis is true, this estuary plant can be grown in upland or coastal desert regions using conventional farming systems.



Oil seed germination under tap (left) and 150 me NaCl saline water (right)



Moisture stress effects on Salicornia growth under tap (left) and 150 me NaCl saline water (right)