International agriculture is not the primary concern of the research program at El Paso. However, some projects conducted were prompted by international situations. For example, early research on production of high strength cotton was prompted by the need to produce parachutes for the war efforts. Research into Guayule (to make airplane tires) was prompted by the Strategic Crop Development Act to hedge against potential curtail on natural rubber supply. It is likely that research into biofuel crops will become an integral part of research at El Paso.

**Early Contributions**

The Middle Rio Grande (MRG) project is among the first irrigation projects developed under the Reclamation Act, and has made a significant contribution to the development of irrigation water quality guidelines, such as those developed in 1954 by the Salinity Laboratory. Another early contribution to salinity management came from a conference held at the El Paso Experiment Station in 1951. Frank Eaton of the US salinity laboratory proposed the steady state leaching equation which was subsequently adopted by every textbook throughout the world. The equation was referred to as “Yaleta Formula” at the time (Fig IV-1).

**Irrigation with Saline Water**

The irrigation water quality criteria develop from the experience of the MRG project were conservative, and water with dissolved salt contents of a few thousands ppm was considered unsuitable for irrigation. In 1964, we presented a paper entitled “An Overview of Saline Water Irrigation in Far West Texas” at an irrigation conference held in Phoenix. The emphasis of the presentation was the experience of the Pecos River Basin as well as Northern Africa (Fig IV-2) where water of 5000 ppm is commonly used for irrigation. This experience indicates that usability of water for irrigation depends on soil types, besides salinity of the water and salt tolerance of the crops to be grown. This idea has received little attention at the time, but became a norm when the Arava Irrigation project in Israel began using their saline groundwater.

**Guayule Research & Development**

Guayule, a shrub native to Far West Texas and Northern Mexico, contains rubber suitable for manufacturing of tires for fighter jet planes (Fig IV-3) and became a subject of research and developments under the Strategic Crop Development Act. We have demonstrated that guayule can be established with initial irrigation, and can be left unirrigated, to increase the domestic emergency supply of rubber (Fig IV-4). In addition, we developed a comprehensive article on salt tolerance of guayule as well as the water requirements for establishing guayule. These research activities took place under the guidance of the US-Mexico Joint Commissions on guayule.

**Reclamation of Salt-Affected Soils**

Increasing irrigation activities resulted in waterlogging and increasing soil salinization in dry areas of the world. This problem is similar to the situation existed in the Middle Rio Grande Project prior to construction of drains. Reclamation of these salted areas involves drainage, deep chiseling and salt leaching. We found that the addition of chemical amendment, especially sulfuric acid (Fig IV-5) is helpful for leaching salts as documented in several publications. In 1990, we had an opportunity to join the scientific exchange program between the US and India. Because of the limited supply of soil amendment, Indian farmers have relied on using certain plants to reclaim sodium-affected soils (Fig IV-6). This idea was tested successfully in reclamation of sandy sodic soils in Idaho using salt tolerant sorghum. When tested in the MRG basin, it provided a crop rotation value, but was ineffective for reclaiming salt-affected clayey soils because of insufficient soil permeability.

**Halophyte Utilization**

The primary motive to use halophytes (highly salt-tolerant plants) came from the desire to use salt-affected soils without costly reclamation. This idea has been popular among developing countries. There was also a motive among the middle eastern countries to utilize brackish water for irrigation. We tested salt tolerance of many grass species which have a fodder value. These species were found salt-tolerant, but not exceptionally. We also tested salt tolerance of saltbush and several halophytes naturally growing Fig IV-7, these plants were found to have optimum salt level well below that of sea water. Salicornia (S. bigelovii) is another halophyte tested. It was found to tolerate seawater salinity (Fig IV-7), but the optimum salinity is likely to be well below that of sea water. Irrigation of these plants using brackish water is within a realm of possibility in sandy soils.

**Global Availability of Soil & Water Resources**

Industrialized nations, including the US became the net importer of food items in this global economy. There is a concern if there are sufficient global soil and water resources to supply food, animal fodder, and part of energy needs in the long term both in industrialized nations and in developing countries. We examined this question using the FAO and the World Bank data base in 2000. A conclusion at the time was that soil and water resources of the earth are sufficient to provide food and feed grains, provided that the yield can be sustained or increased, mainly through fertilization and irrigation. The availability of soil and water resources needed to supplement energy needs is yet to be determined, and semi-arid areas, salt-affected lands and the coastal desert are among the potential sites for biofuel production (Fig IV-8).

Thank you, and support your state’s agricultural research agency.