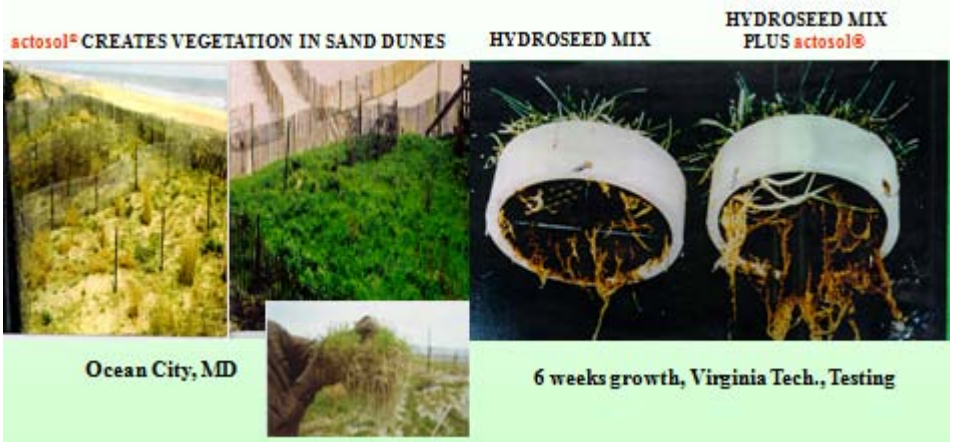
actosol®	**actosol® Facilitates Crops and Plant Growth in Soils and Water with High Salinity** **FIELD TRIALS Report #15**

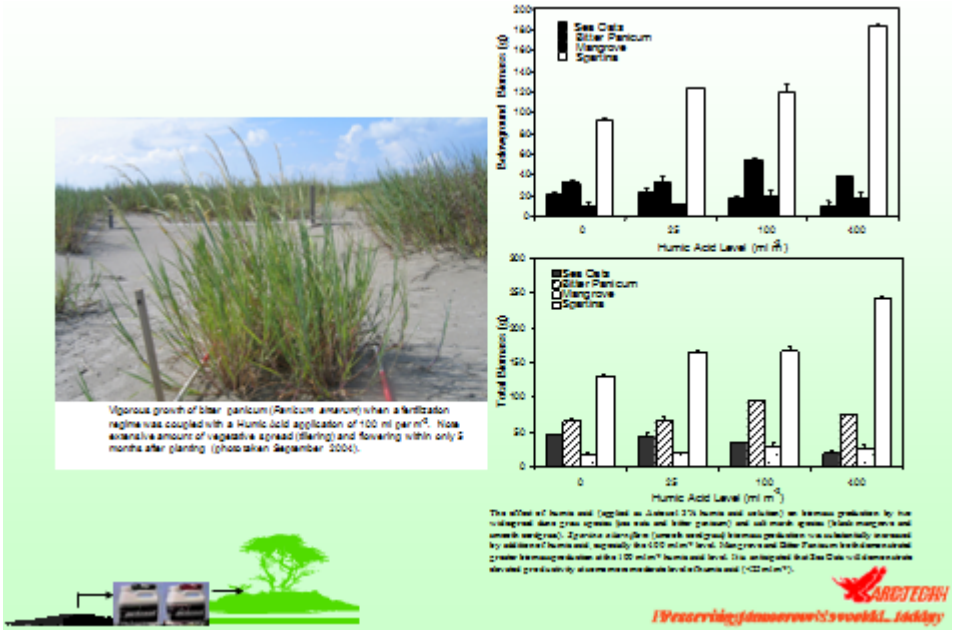
actosol® Successful Applications for Increased Crop Production and Plant Growth in Soils with High Salinity and Water with High Salinity

High salinity of as much as 2000 ppm in soils and in irrigation water inhibits the uptake of water by the plant due to increased osmotic pressure, which results in water moving from the plant to soil and thus the plants become desiccated and growth is severely inhibited. High Sodium also exchanges with potash and other cations in the clays and sodium clays being very fine particles result in forming compact soils and severely decreases its infiltration properties and thus limiting the water, air movement in the soil and as well as retard the root growth. The adverse impacts of high salinity have become a major challenge in maintaining fertile soils and grow crops and sustain vegetative growth. The unique properties of a proprietary formulation of organic humic acid in the actosol® has been successfully proven in mitigating the above adverse effects of salinity and increases the crop yields and as well as maintain vegetative growth in several applications as described below:

1. BEACH SAND DUNE IN OCEAN CITY, MARYLAND AND GULF COAST ON MARSH LAND IN LOUSINIA USA: The beach sand on the shores of Ocean become highly enriched in salt during the repeated highly saline water encroachment and evaporation. Thus hardly any vegetative growth can be sustained on the beaches. Actosol® at a rate of 5 gallons per acre was applied as part of the hydroseed mix (recycled wood fiber mulch, biodegradable tack, seed mix of 1/3 perennial rye,1/3 grain rye and 1/3 K-31 fescue at 10 lbs/1000 square feet). Germination resulted in three days and within 10 days the entire dune was covered in lush green growth. Approximately a month and half later, samples were taken from the test site. The root development was foot and half deep and massive as shown in the photo below**:**



Prof. Mark Hester now at the University of Louisiana conducted field tests with actosol® to evaluate its effectiveness on growth of four varieties of commonly grown sea grasses on marsh lands in Louisiana for coastal land restoration. actosol® was tested at four dosage rates. Results shown below support that the application of actosol® resulted in enhanced growth of both root biomass and top growth. Details of Prof. Hester study are published in the Journal of Coastal Research v.24, March 2006.



2. EGYPT: Dr. El Shall Saad, an agriculture/horticulture expert in Egypt has been helping farmers in using actosol® in growing fruit crops in the desert land areas of Egypt. In these areas the farmers depend up on highly saline water from ground water and as well as the sewage water for irrigation. This has been resulting in decrease in crop yield and as well as impairment of the soils by salt encrustation and as well decrease in the infiltration of the soils. Dr. Saad has successfully assisting the farmers in Egypt in reversing these adverse impacts and improving the development of root mass with applications of actosol® at 2-3 gallons per acre added to the saline water in the drip irrigation lines and as well foliar applications. The unique properties of humic acid and formulated into specific formulation in actosol® are assisting in sustaining robust plant growth in desert land soils in Egypt containing as high as 16,000 ppm salt concentrations.

The increased root mass development is shown in Photo below and application of actosol® through soil and foliar on mango trees almost doubled the yield as shown in the Photo below.

3.WYOMING: Mr. Robert Downey of Energy Ingenuity of Colorado demonstrated the use of actosol® to J.M. HUBER Inc. , a leading coal bed methane producer in Wyoming who was faced with costly disposal of high salinity water produced during the production of gas by dewatering the coal seams. The producer water contained high salinity resulting into 50+ SAR (Sodium Adsorption Ratio) compare the regulatory limit of 10 allowed for land disposal. Mr. Downey installed a field unit consisting of a chemical pulse pump and a turbine flow meter mounted on a small skid for automated metering in actosol® into the produced water prior to irrigation of the adjoining land area. actosol® was metered in to add only 50 ppm into the water during the 30 days of the 45 days of test period. The control area received only produced water without any addition of actosol®. The test area showed lush green vegetative growth without any bare spots compare to the control as shown below in the Photo. The treatment costs based on $10 per gallon of actosol® resulted in $0.02/barrel 9 42 gallons). A typical CBM well in Wyoming produces 500,000 to 1,000,000 barrels of water in its 7-10 years lifetime. This represents a total cost of about $10,000-20,000 for lifetime or only $1,000-2,900 per year.

Amazingly, the growth rate of the alfalfa and wheatgrass was significantly better – thicker, taller and a much darker green color - in the plot where the Actosol-Z™ was added, even though only about 25% of the prescribed 100 ppm concentration of Actosol-Z® was actually applied. This is also evident in the photos below, where the agricultural consultant is shown collecting alfalfa and wheatgrass samples for analysis.

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