

tending the University of California or California Polytechnique Institute. Several graduate from these schools and are now working in the horticulture industry of San Diego County.

MODERATOR WEIDNER: Thank you, Jim. I would now like to introduce Chuck Klein, Horticulturist at Sea World, which you will visit on your tour tomorrow.

## LANDSCAPE HORTICULTURE PROBLEMS AT SEA WORLD

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Coming from a background of botanical work, retail nursery, and landscape contracting, I have found many of the problems and challenges at Sea World to be unique.

Sea World is a marine-oriented park which entertains approximately two million people every year in its San Diego operation. We also have a park in Ohio and one in Florida. Both our Florida and San Diego parks operate 365 days of the year and are often open for night parties and special events.

The entire San Diego Mission Bay area is built on a reclaimed estuary. Dumping of every sort of material has gone into the creation of the land area that Sea World is on, although the major part of the fill came from mud that was pumped out to create the land areas. As the years have gone by, most of the salts have leached out of the soil leaving mostly a sand base requiring constant fertilizing. We do have a few large areas where a clay layer exists that is impervious to water. On top of these areas has been pumped bay fill that is rich in organic material, and on top of this we have topsoil and plantings. Anaerobic bacteria have started growing in some of these areas. We have consulted with the experts, we've drilled holes and put in drainage to no avail, but the bacteria keep spreading, producing noxious odors, and killing plants.

Even though I still enjoy finding new plants to add to our Sea World plantings, now numbering over 400 species, I have learned

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that the primary function of plants at Sea World is to fulfill a specific need. These can be as varied as providing a screen or a barrier, being ornamental, or possibly providing waterfowl with an appropriate background or a nesting area. Above all, the primary criterion is that these plants must be beautiful and presentable 365 days of the year.

As a bonus toward better growing, our landscape architects have designed the areas with many large and flowing mounds. This not only facilitates the partial hiding of crowds, and makes the park more interesting and restful, it also gives us mounds of good topsoil to plant our trees and shrubs in. One special planting for me is the collection of fine Torrey pines, *Pinus torreyana*, around our Starkist Theater building. We often strike salt water at the six foot level and couldn't have these magnificent trees if we didn't have this extra soil in many parts of the park.

It would be impossible to include all of the fascinating and different problems that arise in a park like this, but I would like to mention a project I have carried on these last two years with our curator of birds. One of the desires of the Sea World management has been to build an unsurpassed collection of waterfowl for our many fresh and salt water ponds in the park and to integrate these areas into the general park landscaping. Sea World has always maintained an immaculate park. It is our feeling that the public not only deserves this kind of environment, but will react to our fine landscaping and clean grounds by not littering or destroying plants and property.

Our problem is one of maintaining a high degree of finished landscaping and cleanliness while coping with the natural messiness that comes with having one of the country's largest waterfowl collections. Birds are naturally dirty and also look on many of the plants as a delectable luncheon. We feel we are well on the way to solving the landscaping and maintenance of areas so that birds can live in health and breed properly, areas which resemble what we think of as a typical bird habitat while getting away from the bedraggled, unimaginative, smelly "Duck Pond" so common to all of us. We have lots to learn about the plants that will survive the onslaughts of mischievous geese and all the salt water dragged up onto the plants from thousands of webbed feet, but we feel we have accomplished much already.

Adding to the plants we use, we have tried to bring quality rocks from local mountain sources and artistic driftwood pieces that blend harmoniously with the surroundings. Much of the wood we have used is the Western red cedar, *Thuja plicata*, from the Olympic Peninsula in Washington.

Another project I have been working on is the introducing of more color into the park plantings that is workable and not out-

rageously expensive. Large areas of intensive color plantations are almost impossible to maintain in top condition without a Dupont pocketbook; however, it is my belief that well placed small areas of color can be just as effective when the total planting is as attractive as I found Sea World to be when I took over. I have been removing relatively small areas of innocuous plantings and replacing them with annuals and long blooming perennials. Areas needing color, but not receptive to beds, often are spruced up with tasteful clay pots, well-designed wooden planters, or hanging baskets. So far this experiment has paid off well in a general upgrading of the park. I have been warned of the dangers of damping-off fungi, extra labor, etc. but, so far, with the help of one good man whose main duty is to feed, water, and clean these plantings I find them no more labor-consuming than a bed of *Moraeas* and much more attractive. As for the disease problems, I know I will eventually have to fumigate the soil, but so far have conquered these problems with applications of Truban.

MODERATOR WEIDNER: Jim Degen, our next speaker, graduated from California Polytechnic University, Pomona, California, some years ago. He became a landscape designer and contractor and then returned to Cal Poly, and has taught courses in plant materials for about 15 years. I would like to introduce to you Jim Degen.