

Any of the problem weeds commonly found in Western Australian nurseries, e.g. flick weeds, oxalis, milk weed, pampas grass, summer grass, crab grass, and thistles are being controlled by regular applications of Yield. Presently our soil mix consists of  $\frac{1}{3}$  silica +  $\frac{2}{3}$  sawdust-woodwaste (all hardwood). Any weeds that we happen to miss can be sprayed with Tenoran, particularly flick weed, even up to the seedling stage. Care needs to be taken not to spray Tenoran on groundcovers, asparagus ferns, or grevillias.

Yield can be applied all year round but we do not spray in temperatures over 30°C and the automatic water follows along when scheduled. Tenoran, on the other hand, is allowed to dry on the weeds and plants overnight for best results.

We have conducted trials with Goal, Dacthal, Devrinol, Casoran, Ronstar liquid, and Simazine and are presently doing some trials with Ronstar granuals which look very promising.

## **PLANT PROPAGATION IN THE MIDDLE EAST**

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The growing of palms for food production is one of the most ancient forms of plant propagation. The arid countries of the Middle East such as Saudi Arabia and surrounding nations have propagated palms since time immemorial. The oasis and wadis surrounding sweet water wells and the areas under the palm plantations are used for other forms of plant propagation for many vegetables and fodder crops. Lucerne (alfalfa) is the main green crop grown for their animals.

Each palm tree forms an orchard square, approximately 8 metres by 8 metres, a small mound surrounds each square and holds the water for both palms and green crops. This water is drained off to the next square and the process of irrigation continues.

Over the last 10 to 15 years a great demand has developed for propagation resources which do not exist as we know them.

Seed production of eucalyptus, casuarina, and other Australian native plants is now well established. Other trees and shrubs are also produced from seed under these palm trees.

Earthenware or terracotta pots are plunged about half their depth in the existing sand/soil mixture. The seeds are sown in these pots and receive their water by capillary movement. Water is also applied by spray from hoses over the tops of the pots. As soon as any sign of germination starts to take place this watering is stopped.

There are a few growers who sow seeds directly into prepared beds. The seed germination mixture is generally sand and European peat moss. This method using the existing soil + amendments is not very successful and the germination is often very poor.

The demand for cutting-grown plants has increased because many of the plants cannot be grown easily from seed. Vegetative propagation has created a demand for better propagation facilities and methods.

Generally speaking, plants like *Bougainvillea*, *Hibiscus*, *Clerodendron*, and *Tecoma* are propagated from semi-hardwood cuttings 18 cm in length and very solid material. No wounding or hormones are used. The cuttings are plunged into a well tilled soil/sand and peat mix under the palms and flooded in their normal irrigation cycle. Plants produced are often very unsatisfactory — root development often occurs on only one side of the plant. This may be due to the competition from the palm tree roots and the effects of the saline water.

Where cuttings are placed in terracotta pots and plunged into the sand, better results are obtained. However, at present much of the plant material is imported and grown-on from tube or liner size plants. This type of plant material is grown in Jordan, Syria, Pakistan, Lebanon, and India and is the usual type of cutting potted up in the nursery.

The growing-on of imported plants and the above cuttings have seen these nurseries expand under very harsh conditions. These conditions have resulted in this type of propagation. The water is so saline that mist propagation is just about out of the question. Nurserymen and propagators are reluctant to change their methods and they continue to use very old methods of propagation.

The collection of propagation material, even oleanders, is also a problem as both day and night temperatures are very high with low humidity. The material collected has to be very tough to survive under these conditions. Oleander is a native of Oman and is a beautiful plant in the wild. Animals graze among the oleanders with no apparent ill effects.

It is quite common to see air layers on all sorts of plants — oleanders, hibiscus, and bougainvillea just to name a few.



This method of propagation gives quite large plants under very harsh conditions and is very popular.

Nurseries could use mist propagation methods if the rain water was collected off roofs, etc.; however, this is very difficult as many areas such as the U.A.E. have not had more than 10 mm of rain each year for the last 15 years and in some places generations of people have never seen rain. Most underground water is very saline and not suitable for mist systems.

West Australia and much of the Northern Territory have plant material suitable for these countries. I recommend that plant propagators in the Middle East study Australian methods and plants in relation to salt tolerance, heat and drought resistance, and propagation.

Propagation of Australian dry land and salt tolerant plants has not been well developed as many of these plants are put in the "too hard" category. There are exceptions, however, and many of our plant propagators who persevere will be richly rewarded.

Plant propagators in Australia have vast quantities of native material available, (Table 1). However, selection of plants especially for dry lands and salt tolerance creates propagation problems. Evaluation of vegetatively propagated plants will take time as the selection for material suitable for reclamation of saline soils may involve field trials in many different situations. There is, however, a great opportunity for those propagators who do this form of research. Much of this has been done in Australia and our propagators should continue this work and increase the variety of plant material successfully propagated.

**Table 1.** Some native Australian genera suitable for dry land and salty environments.

<i>Atriplex</i>	<i>Hakea</i>	<i>Myoporum</i>
<i>Callitris</i>	<i>Hardenbergia</i>	<i>Olearia</i>
<i>Callistemon</i>	<i>Helichrysum</i>	<i>Persoonia</i>
<i>Carpobrotus</i>	<i>Helipterum</i>	<i>Petalostylis</i>
<i>Clianthus</i>	<i>Hibbertia</i>	<i>Petrophile</i>
<i>Correa</i>	<i>Isopogon</i>	<i>Ptilitus</i>
<i>Dampiera</i>	<i>Kennedia</i>	<i>Stylidium</i>
<i>Darwinia</i>	<i>Kunzea</i>	<i>Swansonia</i>
<i>Dryandra</i>	<i>Lachnostachys eriobotrya</i>	<i>Verticordia</i>
<i>Eremophila</i>	<i>Macropidia</i>	<i>Westringia</i>
<i>Frankenia</i>	<i>Melaleuca</i>	<i>Xylomelum</i>
<i>Grevillea</i>		
<i>Acacia</i>	} selected seed lines and salt tolerant species	
<i>Banksia</i>		
<i>Casuarina</i>		
<i>Eucalyptus</i>		

Millions of plants are required for regeneration programmes in mining sites and disaster areas both in Australia and overseas. The overseas requirements for Australian plants to suit the above conditions is larger than most plant propagators and nurserymen realize.

Much of Australia's nursery production, especially in West Australia, Northern Territory, and South Australia should be developed by our plant propagators and nurserymen for these Middle East markets. I can imagine how hard it would be for any plant propagator not used to saline waters, high temperatures, and desert conditions and shortage of propagation material to start a nursery.

There must be people in our society who have experience in this type of propagation and nursery production. The opportunity to grow plant material in Australia or in joint ventures in the Middle East and overseas countries exists for those propagators willing to accept this challenge. Examples of joint ventures can be seen in Saudi Arabia, U.A.E., Kuwait, and Bahrain. Indeed one Australian nurseryman is engaged in such a project in Kuwait.

Protected areas using natural windbreaks and buildings such as shade and glasshouses properly sited can and does soften the environment, enabling the use of more modern methods of propagation.

It is hoped that in the IPPS there will be plant propagators willing to extend their knowledge and expertise in the growing of salt tolerant dry land trees, shrubs, ground covers, and native grasses and present us with export opportunities. In no way is any of this presentation meant to criticise the efforts and endeavors of plant propagators in the Middle East countries. Propagation of date palms is really wonderful and I admire the propagator's patience. Date production in the Middle East is of a high standard and has to be seen to be believed.