The plant deaths observed in soil mixes 1 and 2 clearly suggest phosphate toxicity. Further work is required to eliminate the possibility that factors other than phosphate were involved. This result, however, is in agreement with the findings recently reported by Webb (5).

The good growth rate observed in soil mixes 4 and 5, following the application of iron chelate, clearly shows that all species studied could be successfully grown in the presence of high calcium levels and at pH's in excess of 8. The present results, however, do not indicate any direct beneficial effect of calcium or high pH. Further work is in progress to clarify this and to investigate superphosphate, calcium and pH interactions. The results reported by Webb (5) were obtained using natural Canberra soils in comparison to our use of UC mixes. It has been shown that calcium inhibits *Phytophthora cinnamomi* (2) and high pH is known to reduce phosphate availability. It is possible that the calcium effect observed by Webb is an indirect one, acting via a control of phosphate or *P. cinnamomi* levels or other factors.

Acknowledgement. The authors would like to acknowledge the technical assistance of Mr. B. Hadlow. They would also like to thank Mr. J. Webb for useful discussion relating to this work.

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NATIVE AUSTRALIAN PLANTS FOR INDUSTRIAL DEVELOPMENT

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By definition a native plant is one which occurs naturally in any given region. Thus Australian native plants are those which occurred prior to the invasion of the white man and his

attendant introduced species. Therefore it can be truthfully said that native plants are the ultimate in evolution to the physical conditions of the Australian environment. Paraphrasing that, natural selection and thus resultant evolution under the pressures of the physical conditions of the Australian environment have led to vegetative survivors over a vast period of time being the modern native plants. These survivors are, perforce, those which are most able to persist in a given environment. This does not belittle the value of acclimatized species which often produce excellent prime growth. Because of their optimum value, Australian native plants are of tremendous importance for industrial projects which may change or modify or have an affect on the Australian environment. Let us make it quite clear that any man engendered project has an effect on the existing natural environment.

At the beginning of European man's invasion of the Australian continent, emphasis was placed on the acclimatization of European and other world plants to Australian conditions on the basis of economic needs and agricultural demands. There was a deep feeling of alienism about the Australian bush and a drive to subjugate this land-structure. Replacing it with familiar plants and animals of the European landscape made good sense. So much so, that individuals were given knighthoods if they subjugated sufficiently vast areas of the Australian landscape. In those unenlightened and uneducated days, industrialists and developers were the saviours of mankind — everexpanding, everincreasing, and everchanging the environment to something familiar and beloved.

All of this began no more than ten human generations ago. By a quirk of human nature, the sixth generation of changers began to question the validity of the argument to change for its own sake and, for the first time, Australian-born generations recognized the intrinsic value of the evolved species of the Australian landscape. This awareness manifest itself in a number of ways: most significantly in changes to legislation, backed by public opinion, which denied developers the untrammelled right of destructive change. These changes brought with them specialized requirements such as environmental impact statements, plans of management, and rehabilitation and restoration programs. Today new industrial projects proceed conditionally and often require either restoration to original condition or rehabilitation to the satisfaction of the relevant authority.

In practical terms it comes down to restoration, i.e. returning to practical original condition or rehabilitation, or the returning to a condition which does not cause long term damage to the area nor loss to other land uses in the vicinity. Such requirements are completely new in the history of engineering

and development. Most areas of expertise must be developed to consider them in the context of the proposal. As previously stated, requirements can be firstly: restoration to the original condition by virtue of the desirability of the original condition. For example, any development in a designated National Park would have as a mandatory requirement, restoration to its original condition validated by the vestment of the land area for a particular purpose, viz. natural bushland. Any alternate uses must be cognizant of the original designated use and comply accordingly.

The second category of requirement is that of aesthetic value. A project may impinge on the eye of the beholder in such a way as to cause distress. There is a decrease in the concept of beauty in the eye of the beholder. The developer may be required to beautify an area which is normally done using landscape techniques.

The third area of concern is camouflage. Many projects require fixtures which although functional and well designed are not aesthetically attractive. The screening of these for both visual and auditory aspects is often accomplished by the use of vegetative plantings.

Faced with these mandatory requirements any good developer looks to a solution which is cost effective. Consideration must be given to such things as preparation of an E.I.S., cost of plant stock, cost of planting, and ongoing maintenance. The latter factor is perhaps the most significant single cost factor in any such decision making. It becomes obvious that the self-maintaining drought-resistant plants evolved in the Australian environment are the ones most desirable to fulfill the obligatory needs of licensing authorities.

The methods of establishing native plants for required areas are variable and reputed experts disagree about technique to a considerable degree. However, there are three major techniques:-

1. **The orthodox gardener technique.** This requires ground preparation, the addition of seed and fertilizer and ongoing maintenance such as watering. Seed stock and fertilizers need to be chosen with an awareness of environmental factors such as tolerance of plant species to existing conditions, amount of erosion likely prior to existing conditions; amount of erosion likely prior to initial growth, stability of chosen species in terms of colonizing plants, toxicity values of chosen fertilizers to particular species, age and structure of selected plant species, and the self-perpetuating values of selected species. That is by no means an exhaustive list of considerations.

The use of stock plants is valid in some circumstances.

Such circumstances require constant maintenance depending on planting size, i.e. tube plants have a long survival rate without maintenance whereas advanced plants have a greater cover value but for a shorter time.

2. **The use of sprays.** Sprays involve a carrier which may be wood pulp, paper, sugar cane fibre or meadow hay; a bonding agent, which may be bitumenous or cellulose gel; plus seed or cuttings, and fertilizer. These are all mixed with water and pressure-sprayed onto the treatment area. There are an infinite number of combinations of formulae — as might be expected when one considers the infinite number of ecosystems with which we are dealing in Australia.

3. **Mulch or tritter** is commonly used in areas of high sensitivity. Existing plant cover is broken down to a mulch or wood chip and respread over the surface to be restored. This has a number of advantages: there is no loss of fertility from existing sources and the seed load is derived from original stock material. This is a distinct advantage in reducing alterations to the genotype of localized native species concerned, Nursery stock, albeit the same nominated species, is very often drawn from a different genotype and the invasion of this may bring to pass quite unintended environmental side-effects.

Although these are the main methods of using native plants, combinations of these methods are viable. Dependent on the requirements of an area, combinations lead to the best possible results under any given circumstances.

In using native plants to overcome environmental impacts, both natural and sociological, there are a number of problem areas which must be considered when making the decision as to the technique to be employed:-

a) The question of seed viability. When native plant seed of certain species is mixed with phosphate fertilizers or loam there is often a loss in seed viability. Native plant seed which is stockpiled in soil, or dry stored has a similar viability loss over a period of time. Seed which is broadcast scattered in wet media may have a germination rate which is not backed up by a continued growing season, leading to a total loss of some species in the mix.

b) Cutting viability in mulches and sprays is of particular significance. Few plants will accept the non-sterile situations involved in mass cutting planting; the exceptions are stoloniferous native plants which will accept chopping and replanting, provided sufficient of the adjacent colloidal soil communities are contained with the cuttings. Generally speaking, mass cutting is a specialized approach which should only be used by skilled personnel.

c) Nursery stock offers a number of problems, the most common being the "pampered" syndrome. Nursery stock is nurtured in selected soil, under optimum light, watering and fertilizing conditions. This permits maximum growth of the plant under the idealized conditions. The removal of such a pampered individual into the harsh reality of survival often leads to trauma, resulting in death. Because of this pampered syndrome, nursery stock must only be considered in terms of ongoing maintenance unless plantings can be guaranteed in seasons or conditions which permit the overcoming of the transplant trauma.

d) Another problem not pertinent to the realities of plant propagation but highly significant in the regeneration of disturbed areas is governmental authority awareness. Some government authorities still maintain Europeanization as an ideal and not only have no information about alternate methods of restoration but do not wish to know about them. A designated governmental authority may dictate to a developer that he will plant poplars, willows, petunias and roses instead of much more functional and cost-effective native plants. In this area it is essential that the International Plant Propagators' Society and allied organizations accept their proper role in educating the decision-making authorities as to the value of native plants. These contractually fulfill with cost effective, low maintenance species plants guaranteed to meet the needs of the most meticulous government servants.

In conclusion, I believe that the Plant Propagators and allied people in Australia have not faced up to the fact that industry requires by mandate an enormous ongoing amount of restoration and rehabilitation. Members of this Society are content to sit back and wait for orders to come in from the development industries across Australia. You have the capacity, the knowledge, and the stock to advise the developers of what they should be doing and looking at — all that you lack is the awareness, and I sincerely trust that this paper will make you more aware.

CONTAINERIZED ROSE GROWING

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Roses are propagated throughout the world using the same basic techniques. What we are doing that is different from the