

owing to the combined effects of fungal and bacterial pathogens and insect attack. There can be little doubt that the reproductive capacity of *Harrisia* has contributed substantially to its establishment in the new environment.

Establishment of *Harrisia* at Collinsville is due to historical accident, and not to any unique feature of the Collinsville environment. Although the Collinsville environment has proved very favourable for establishment of *Harrisia*, the same environmental conditions pertain over large areas of Queensland and elsewhere in Australia. Perhaps the major factor favouring establishment of *Harrisia* at Collinsville was that man allowed it to grow undisturbed for so long.

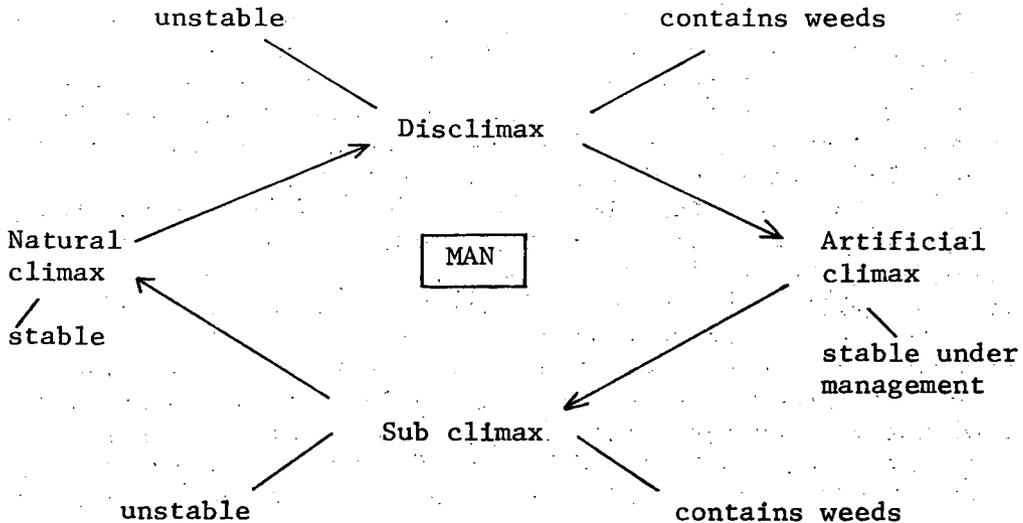
#### MAN, WEEDS AND ENVIRONMENT

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When man modifies the vegetation to a form suitable to his needs he frequently creates a weed problem. The degree of this problem varies, depending on the balance between environment and man's management skills.

A simple basic model is proposed to explain the proposition and some examples of its expression under Australian conditions are discussed.



When management can be adjusted to meet environmental changes we create a relatively stable artificial climax, as represented by a pasture or an orchard; an annual crop is a disclimax. Under our conditions an artificial climax will demonstrate its instability very dramatically in some seasons. As we rarely use a natural climax we are normally working with unstable vegetative forms. Because of this, weeds are either present or always a risk.

The natural climax may change under the influence of major environmental changes but this is normally a very lengthy process. Other changes can take place very rapidly. Our ability to recognize the beginning of change and apply the appropriate management tool is greatly influenced by economics and technology.

To illustrate the model several examples drawn from experience and observation have been chosen. The first two reflect changes caused primarily because economics in the relevant industry, dairying, did not allow the appropriate management skills to be used.

In both the Gippsland district of Victoria and the Far North Coast of New South Wales land was cleared and pastures established for dairying. This author visited both areas in 1968 and was impressed by the similarity of ecological change. In both districts many farms were found in each of the several steps of returning from a good pasture to the original rain forest association. In Gippsland the complete cycle appears to have occurred over 80 years and on the Far North Coast over 40-50 years.

Fertility decline of sown pastures produced a low grade grass pasture which, as management continued to decline, was degraded to a weed phase. In both areas dominant weeds were: a bramble (blackberry or lantana), bracken fern and a composite (ragweed or crofton weed). The next phase appeared to be the invasion of a tree type (dogwood or camphor laurel). Some examples were seen of the original rain forest.

On much of the tablelands of New South Wales the natural climax form is a dry sclerophyll forest. This was cleared to produce a *Danthonia*-native medic pasture which was in some cases replaced by an annual grass-sub. clover improved pasture maintained by annual topdressing with superphosphate.

Under good management the natural pasture allows a medium level of production, and is relatively stable. Under poor management (overstocking) fertility drops and poor grasses appear. This is followed by a weed phase including bracken, blackberry and serrated tussock and then timber regrowth.

Improved pastures increased fertility and thistles invaded many pastures. However, perennial pasture grasses, in combination with good management, stabilize the situation.

In some parts of the Western Division a much more complex relationship occurs. Between Cobar and Byrock thick scrub regeneration has occurred. This scrub established following the removal of rabbits, several good years, increased stock numbers and lack of bush fires. One is tempted to predict that this association, whilst differing from that existing before white men came, is the true natural climax. Probably the aboriginal, by keeping kangaroos and other animals (his stock) to a level representing light stocking and allowing bush fires to go unchecked, used an artificial climax.

Under commercial grazing tussock grasses were removed and fires restricted, allowing the growth of scrub, without fires to kill off seedlings. In the area examined litter build-up cannot maintain a burn.

Two conclusions are drawn:

- (1) Weeds are an inevitable result of poor management. The length of time the weed phase will be present depends on the level of management skill applied.

- (2) The basic model can be used to predict weed problems and to develop controls before they occur.