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### THE EUCALYPTUS.

From time to time a considerable number of letters appear in the local papers commenting on the desirability of planting varieties of the Eucalyptus as suitable roadside trees, and also, on account of their supposed value in purifying localities where severe fevers are prevalent.

We have received many letters asking for advice on the same subjects, and in order to give a general answer to all such correspondents, I shall endeavour to outline the success which has attended the efforts of this Department, to introduce any of the Eucalyptus family.

#### A Few General Characteristics of Eucalypts.

As is probably well known, the Eucalyptus or Eucalypts are natives of Australia and a few of the adjacent Islands. The genus is a large one, comprising over 150 species. Many of the species are trees varying in height—some of them being amongst the largest in the World, while others are small shrubs which thrive in desert and alpine regions. A number of the species are vigorous growers. The Blue Gum (*Eucalyptus globulus*) is one of the fastest growing of the genus.

From the middle of the last century, the Eucalypts have been distributed all over the World with various degrees of success. As is only to be expected, the most marked success has been attained in countries having a somewhat similar climate to Australia. Eucalypts have been successfully established in Algeria, South Africa, on the Nilghiri and Palui Hills and in North and South America. It is interesting to note that during the last few years, the chief product of the Eucalypts *i.e.*, Eucalyptus Oil has largely been produced in California.

In Australia, the Eucalypts grow in a great variety of soils and climates, varying from deserts or dry mountainous regions to low swamps and moist mountainous ones. It would therefore seem possible to select species which would be suitable to a great variety of situations. All the larger arboreal forms delight in a warm climate but other conditions must also exist to enable them to become successfully established.

Prof. Charles Naudin in his memoir on the genus says:—"The first condition of success in the culture of Eucalypts is a climate appropriate to their nature; that is to say, for a great majority of the species, warm summers, a *moderate amount of rain, a certain amount of atmospheric dryness*, plenty of sunlight and very temperate winters."

I have placed in italics the portion of the quotation from Prof. Naudin's memoir which particularly applies to the Straits and Federated Malay States. It cannot be said that with an average annual rainfall of 96 inches we enjoy a *moderate supply* of rain, nor for the same reason can we lay claim to the certain amount of *atmospheric dryness* in our climate necessary to their successful culture.

Most Eucalypts are benefited by occasional heavy rainfalls which thoroughly saturate the soil, as indeed most arboreal plants are, but frequent heavy rains and the subsequent very humid atmosphere are not conducive to their healthful growth. As has already been mentioned, a few of the species grow in swampy, humid regions, but the majority, though able to absorb large quantities of water by means of their roots, prefer for their aboveground parts a dry atmosphere, at least for a considerable portion of the year.

In Australia, the Eucalypts are generally found forming large forests and indeed many of them do not form very desirable shade trees when planted for that purpose.

As I shall endeavour to show, the raising of Eucalypts is attended with no little difficulty and in view of the fact that the soils and conditions our present roadside trees are subject to, would destroy any chance the Eucalypts might have (provided climatic conditions were suitable) it would seem that we must be content for the present at any rate, with the large and excellent variety of other trees that are available.

It is generally believed that Eucalypts have a most benefiting influence on the climate of those regions in which they are planted to any large extent. There seems to be a great diversity of opinion on this point, however, as the following quotations will show.

The American Consul at Florence, in 1894, writes in his Consular Reports, "It is this latter quality (the property of distributing a balsamic atmosphere) which has brought the Eucalyptus into such prominence in Italy, and has been the cause, not only of the planting of thousands of trees by private individuals and public corporations, but of its receiving the indorsement of the Italian Government as well."

It seems strange that the American Consul at Rome, should take an altogether different view of the subject. In his Consular Report for 1894, he says: "In Italy, although the newspapers had persuaded everyone that the farm of the Tres Fontane, near Rome, had become healthful by means of the Eucalypti, it proved a disagreeable surprise to learn of a sudden outbreak of malaria in 1882 that caused much sickness among the farm hands, while the rest of the Campagna remained perfectly healthy . . . Dr. Montechiare, a practising physician of Rome, who for many years was physician to the penal colony at Tres Fontane, tells me that his experience justifies him in declaring that no beneficial results against malaria has been derived from the planting of the Eucalypts."

Mr. A. J. McClatchie, M.A., in a Bulletin published by the Bureau of Forestry of the United States Department of Agriculture gives a few reasons why such a property has been attributed to the Eucalypts and though it does not decide the question one way or the other it may be worth while to repeat them here. "It is probable that a great part of the change in the sanitary condition of those places, said to have been benefited by Eucalypts, has been due to other causes, such as the making of drainage ditches, etc., and this will partially account for the conflicting opinions on the subject. When, however, the nature and habit of the trees are considered, it is entirely reasonable to believe that, to a certain extent, they beneficially affect the atmosphere in the region of their growth. The grounds for this belief are: First, their great capacity for absorbing moisture from the soil, and thus reducing the quantity of stagnant water in the ground at their roots; second, their corresponding power of giving off fresh from their foliage, the water thus taken up by their roots; third, exhalation from their leaves and other parts, of volatile oils, which affect the climate not only directly but by changing the oxygen of the atmosphere to ozone; fourth, the purification of germ-infested matter by the foliage dropped upon the ground or in pools of standing water. From the combined action of these four characteristics it seems reasonable to believe that the trees would be beneficial to many climates."

Mr. Ridley did not believe for an instant that, in so far as the Straits and Federated Malay States were concerned, the Eucalypts would influence climatic conditions in any way whatever. We may take it, however, that, unless the Eucalypts thrive exceedingly well and are planted in the form of large forests, no benefits can possibly be derived therefrom. It is not to be expected that a few Eucalyptus trees planted in a swamp, would change the whole climatic conditions of that swamp just as a few nodules on a leguminous plant cannot be expected to have the effect of enriching a large area in nitrogen, to any appreciable extent.

### **Eucalypts in the Botanic Gardens.**

The earliest record of the introduction of Eucalypts to the Botanic Gardens, Singapore was on January 4th, 1876, or practically

12 months after the founding of the Gardens. They were presented by Dr. Schomburg of Adelaide and consisted of packets of seed of the following varieties:—*E. alpina*; *E. amygdalina*; *E. calophylla*; *E. coriacea*; *E. empetrifolia*; *E. ficifolia*; *E. globulus*; *E. Lehmanni*; *E. marginata*; *E. oblique*; *E. piperita*; *E. unifera* and an unnamed species from Tasmania.

Seed of *E. tereticornis* were received in June, 1876, from the Botanic Gardens of Rockhampton and at the same time plants were received of *E. eugenoides* from the same Gardens. In addition to the already mentioned varieties, the following were received from time to time:—*E. citriodora*, *goniocalyx*, *rostrata*, *siderophloia* and *viminalis* from the Gardens, Brisbane in July, 1877. *E. Baileyii* from the Queensland Arboricultural Society in 1878; plants of *E. longifolia* and *cornuta* in 1878, from the Botanic Gardens, Brisbane; *E. callosa*, *haematostoma*, *pilularis* and *paniculata*, from the Botanic Gardens, Adelaide, in 1879 and so on, practically every year, in ever increasing variety down to the present year. (I have enumerated a few of the many varieties received in order that there may be no doubt about all or nearly all the varieties, which had any likelihood of success in this climate, being tried.)

It would seem quite permissible therefore, to imagine that there ought to be a considerable number of large trees in the Gardens at the present time, but such is indeed far from being the case. Out of the many hundreds of packets of seed which must have been presented to the Gardens during their existence, only one specimen of any dimension is to be found in the Upper Garden *i.e.*, *E. intermedia*? was planted on rising ground adjacent to the bandstand. It is now a tree of about sixty feet tall and has a circumference of six feet at a distance of three feet from the ground.

The situation must be described as being dry and favourable to the growth of plants requiring such an one (I have been unable to trace "intermedia" in any of the treatises on the genus but as this tree has lately flowered, specimens have been prepared in order that the correct determination may be arrived at).

In the Economic Garden, eleven trees are to be found. Seven of those were planted adjacent to Bukit Timah Road. It is probably well known that this land is frequently covered with water and at no time is the water deeper than about eighteen inches from the surface. The trees do not look healthy and all that can be said of them is that they have merely existed. They are about forty feet in height unbranched and with extremely few leaves on the crowns.

The other four were planted adjacent to the Subordinates Quarters *i.e.* on rising ground. They are practically in a similar state to the other seven and all are slowly dying. No particulars can be obtained as to when those 11 trees were planted nor have I been able to identify them (specimens have also been prepared for identification).

None of those twelve trees can be said to be suitable shade trees as they do not possess one of the essential requirements of a first class shade tree *i.e.*, a good spreading head of branches.

Some six or seven years ago, Mr. Ridley selected the driest part of the Garden for Australian plants; Callistemons, Grevilleas, Acacias and three Eucalypts were planted therein. The present condition of those Eucalypts is as follows;— *E. citriodora* is now about fifteen feet high, of slender growth, the lower branches continually dying off and altogether not in a very healthful condition; *E. gomphocephala* is now about eight feet high and in a similar condition to last; *E. robusta* on the other hand, as the name implies, is of more robust growth. The specimen is now about eighteen feet high and in this case, the lower branches remain on the plant for a much longer period than on any of the other two. It is the most healthy specimen of the three and it will be interesting to note its future growth.

It will be seen therefore, that little or no success has resulted in the endeavour to establish Eucalypts in Singapore.

### Why?

Eucalypts are only and can only be propagated from seed, and it is to the inability of the seedling to withstand our humid climate, that the failure of establishing Eucalypts must be attributed. I have personally sown the seeds and attended them in every way possible and after the seedlings have produced their second leaf they suddenly die, damping off at the neck. This happened to all varieties with but one exception *i.e.*, *E. citriodora*. We have now seven or eight fairly healthy plants in small pots and it is intended to try those at a later date in a variety of situations and note results.

In support of my experience with seed and seedlings I may quote from one of our correspondents. He says:—"I may say that the Eucalyptus has so far shewn no sign of being a success. The seeds were bedded out in the same manner as Tobacco seeds—in "tempat bibits". Only one variety (*E. hemiphloia*) germinated at all in numbers, but these, with a doubtful one here and there in other beds, seemed to be eaten away rapidly and completely. No broken leaves were seen—they simply vanished!"

It may not be amiss to repeat what the late Mr. Murton said in his Report of Botanic Gardens in 1878. He said:—

I have been very successful during the first year in raising the various species of Eucalyptus, which hitherto have proved very difficult to raise from seed in this climate. A number of plants of Eucalypts as well as other plants have been supplied to the Public Works Department for planting in the reservoir grounds near Government Hill and also for the reservoir grounds at Thompson Road.

In his Report for 1878, he said:—

Eucalypts—My anticipation about the Eucalypti when I wrote my last Annual Report, have not been verified; for, although they germinated freely enough, the majority of these species die as they get a few inches high.

*E. globulus* appears to be the worst species for this climate, *E. citriodora*, *E. amygdalinus*, *E. goniocalyx*, *E. pilularis* and *E. calophylla* do best. I attach very little importance, however, to this, as the belief in their prophylactic virtues is now considerably weakened and they are quite unsuited, owing to their straggling, ragged appearance, for garden ornaments.

In his report for 1880, he said:—

When sown *in situ* they seem to thrive fairly well in Singapore but do not appear to stand transplanting. *E. siderophloia*, *E. Baileyi* and one or two other species are growing well in the nursery. (none of those are now to be found).

One must perforce come to the conclusion that the Eucalypts (with rare exceptions) are not suited to our climate, and taken for granted that all the useful and healthful effects which are attributed to the Eucalypts, in so far as influence on climate is concerned, be perfectly true, I think it has been proved conclusively that the tree will not grow in sufficient quantities to warrant further trials.

J. W. ANDERSON.

#### NOTE.

Since writing the above note on the Eucalypts, I have been able to obtain the correct determinations of the eleven large Eucalypts mentioned therein. Specimens were sent to Mr. Maiden, Director of the Botanic Gardens, Sydney and Government Botanist, who most kindly identified them for me. The one adjacent to the bandstand and under the name of *intermedia* has been identified as *E. corymbosa*, Sm., while those in the Economic Gardens are probable specimens of *E. terminalis*, F. & M., but owing to incomplete specimens being sent (no seed being available), Mr. Maiden was unable to say for certain as to whether this was correct or not.

## A SACCHARINE CONSTITUENT OF PARA RUBBER.

In October, 1909, two small specimens of smoked Para rubber from the Botanic Gardens at Singapore, representing a consignment offered for sale in the United Kingdom, were forwarded for examination to the Imperial Institute by brokers in London, who stated that the rubber had been prepared experimentally by the Brazilian method