

## A time for desert blooms

We all know that the desert blooms after heavy rain. And indeed it does. Ephemeral plants do germinate, flower, seed, and die — but their seed doesn't just remain in the ground ready for the next time favourable conditions prevail.

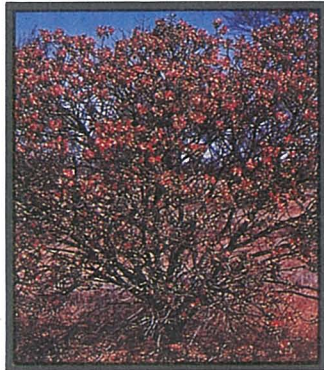
Dr John Mott of the University of Western Australia has found that the annuals must flower every year — be it dry or wet. What's more, each species must flower at its pre-ordained season.

So how do these annuals survive at all? Little pockets, it seems, manage to flower and seed in dry creek-beds during even the driest years. Then in wetter years, seeds blown from these 'oases' also germinate and flower to make the desert bloom.

What about shrubs? People have said that these, too, bloom and fruit when heavy rain falls. But some recent results from an 11-year research program of Dr Stephen Davies have revealed that this is by no means always true.

Dr Davies is a biologist with the CSIRO Division of Wildlife Research. He has spent many years studying why emus make their annual migrations across inland Western Australia. He became interested in the flowering times of trees and shrubs because they provide foods for emus.

He began his studies by marking 165 individual trees and shrubs from 24 species at four sites. Like Dr Mott, he



*Eremophila fraseri* in flower.

was working on Mileura station, which is 140km west of Meekatharra. He chose those particular species — he obtained usable data for 22 — because they had frequently turned up in emu gizzards.

His results showed that flowering and fruiting did not simply depend on good rains. In fact only one species, a *Solanum*, flowered and fruited after rain regardless of the time of year. Mulga and a few other *Acacia* species also flowered if rain occurred at any time. But, unless this flowering occurred at the right season, these species rarely seemed to set fruit.

Instead, most of the shrubs studied flowered and carried fruit at particular times each year — almost regardless of the rainfall. Heavy rain at the right time merely increased the numbers of blooms, and usually (but not always) the amount of fruit set.

Six of the species observed by Dr Davies flowered and set fruit mainly in the autumn, six more mainly in winter, a further three in spring, and six

in summer.

But often the situation was more complicated than that. For example, mulga on Mileura station seemed to need summer rain for its fruit to set and winter rain to make it swell and mature. It only produced heavy crops when good rains fell in both seasons.

To confuse things more, the number of trees of *Acacia pruinocarpa* that flowered seemed to depend on the amount of rainfall in winter, even though the tree flowers in mid summer. This species seemed to provide a particularly reliable source of food for emus. The birds eat the flowers, and some trees flowered in all but one of the 11 years of the study.

Just to complicate the picture still further, two species' flowering and fruiting correlated with winter rainfall in some habitats, and with summer rainfall in others.

Dr Davies thinks that environmental factors other than rain were acting here. Those fruiting after winter rains lived in creeks. He suspects that these creeks are so cold in winter that fruit set after heavy summer rains can't mature. However, more fruit sets during the rapid spring growth, which is made possible by water accumulating during heavy winter rains. This second crop can mature during the summer that follows.

Another feature that seemed to considerably affect fruiting was attack by insects, and to a lesser extent by graz-

ing animals. For example, after summer rain, insects stripped all the leaves off individuals of three species of shrubs. These couldn't flower until they had grown another suit of foliage.

Amazingly, at one site Dr Davies observed mulga trees killed by a heavy hailstorm. At this site mulga trees marked for observation had all their leaves and twigs stripped off, but — luckily for Dr Davies — they did shoot again. However, several nearby trees that had received similar treatment died.

Studies by Dr E. O. Hellmuth of the University of Western Australia have shown that the physiology of some arid zone plants seems to differ very little from that of plants from more temperate climates. The life processes of arid zone plants merely seemed to operate under a wider range of environmental conditions. Thus, shrubs that do well in the arid zone are the most adaptable ones, which can tolerate a wide range of conditions.

Dr Davies' studies of shrubs' flowering seem to bear this observation out. He has also reached a similar conclusion about birds that do well in the arid zone.

Studies of the flowering season and fruit production of some arid zone shrubs and trees in Western Australia. S. J. J. F. Davies. *Journal of Ecology*, 1976, **64**, 665–87.