

DOES FYNBOS NEED TO BURN?

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Protea nana.

Protea seedling in mature fynbos.



‘Fynbos needs fire’ is mentioned in almost every book or article written on fynbos. However, is this statement simply accepted as gospel, and copied from one book to another, or is it actually true? Neither of us is a botanist, and we have found ourselves questioning this assumption more and more frequently. Perhaps not being botanists has distinct advantages as we are not burdened with botanical theories, and perhaps we view the fynbos with more open minds.

The first myth that we want to dispel is ‘fynbos seeds only germinate after fires’. For many fynbos species, this is simply not true. We spent Christmas walking in the Bain’s Kloof Mountains, behind Wellington. High in the mountains is a big population of *Protea nana*, the lovely needle-leaved protea with red nodding flowers, some of which escaped the last fire about seven years ago. The population consists of 7-year-old plants, flowering now for the first time, and a few more or less 15-year-olds, some of which are beginning to die. One plant had died and released its seeds from the old flowerheads, and underneath it were thirty or forty 1-year-old seedlings that had germinated in the middle of 15-year-old veld. Close by we sat in the shade of a huge *Protea nitida*, and had to be careful not to damage the numerous seedlings coming up under the still living shrub. For this to occur, the mature fynbos must have open spaces where there is room for seedlings to grow, and where the exposed seeds can experience the temperature fluctuations required for seed germination, but because of the impoverished soil and harsh conditions on the majority of the south-western Cape mountains, open spaces between clumps of restios, ericas, and proteas are probably the norm, with thick vegetation only occurring on south-facing slopes and in river gullies.

There are obviously species that require fire to stimulate seed germination – many of the legume seeds need the heat of a fire, and some of the nut-seeded restio species require either the heat of the fire or the smoke, or both, and no seed germination is seen between fires. But for many of the species, fire does not seem to be essential. Bulbous plant seeds germinate very well without fire, as do *Erica* seeds. Smoke and heat may certainly increase the germination rate so that there is a huge flush of seedlings after a fire, but without it, germination still occurs at a lower rate that is sufficient to renew the ageing population.

The second myth is ‘fynbos always recovers after fire’. How often have we read this in newspapers, magazines and learned publications? No, it does not always recover, and often recovery is very superficial with the resulting veld missing many of its previous constituents. An example is the Jonkershoek valley, in the Hottentot’s Holland Mountains. This area is one of the wettest in South Africa, and after fire, it apparently recovers rapidly and looks great. Recruitment of *Protea neriifolia*, *Leucospermum gueinzii*, *Leucadendron sessile*, ericas such as *E. savilea* and *E. fastigiata*, grasses and restios is excellent and the bulbous flora responds with great enthusiasm and wonderful displays of colour. However, there used to be a reasonable sized population of *Protea grandiceps* high on the slopes of the valley, and this has now completely disappeared. Two fires only eight years

apart was one fire too many for this slow growing species which had only just flowered for the first time since the last fire, and had as yet set no seed. When the second fire swept through the valley last summer, the plants burned, and left nothing behind.

Another example is in the Cederberg near Clanwilliam. Where does one find decent sized populations of the once frequently encountered *Protea magnifica* in the Cederberg anymore? On a recent trip up Krakadouw Peak we found two plants, growing across a sheet of rock and protected from the frequent fires that burn there. It grows slowly, flowering for the first time only after about eight years, and eight years between fires is now an uncommon occurrence. A third example is the top of the Montagu Pass in the Outeniqua Mountains near George. This area last burned three years ago, and then again this summer. *Protea aurea* and *Leucadendron uliginosum* are now extinct in the burned area – the seedlings were only about 40 cm high when the second fire came through. The only plants that have survived here are the bulbous plants that thrive after fire, and the re-sprouters, as it is unlikely that many of the re-seeders had had time to produce seed. If one examines the species occurring on these frequently burned mountains, there are many re-sprouters such as *Protea nitida*, *Erica cerinthoides*, *Leucadendron salignum*, many restios such as *Elegia*, *Hypodiscus* and *Thamnochortus* species, and many so-called 'weedy' species such as *Cyclopia*, *Muraltia* and *Stoebe*, but most of the slower growing re-seeders are doing badly, and some have disappeared completely.

The next aspect in fynbos recovery is when did it burn and what did the weather do in the season after the fire? Fynbos, on the whole, burns in summer, any time from October or November to March or April. However, if the Cape has an abnormally dry winter, as happened this last year, then fires can occur in June and July as well, and then what happens to the fynbos? One area of Fernkloof Nature Reserve at Hermanus burned in the middle of this last winter, and we went back several times after the fire to see what was doing what. The first thing that we noticed was that at the end of spring all the Proteaceae seedlings were tiny – presumably they had germinated in August and had only had two months of growing time before the rain stopped and the heat of summer arrived. It will be interesting to see how many have survived at the end of the summer - we predict very few. Normally the seeds would germinate in the autumn, and the seedlings would have four or even five months in which to grow big enough roots to keep them going through the hot dry summer. The next thing that we noticed was the lack of bulbous plants that usually flourish after fire. These would normally break dormancy in March or April, and would have been in full growth when the fire came in winter. They certainly did not seem to come up again after the fire, and the only two species that we saw in flower were *Moraea lurida* and a *Geissorhiza* species. Will they all come up again next



Anemone tenuifolia flowering with great enthusiasm after a fire at Jonkershoek. This was the second fire in only 8 years and some species have not had time to set seed and consequently have been completely destroyed.

autumn, or were they killed by the fire? So, recovery of the fynbos in this area has so far been extremely poor.

What did the weather do after the fire? As anyone who lives in the south-western Cape will know, the summers of 1998/1999 and 1999/2000 were dreadful with fires occurring in every mountain range one can think of. Some of the veld was old and some was very young, implying that some areas should have recovered better than others. However, this was not the case and the reason for this was the kind of weather we had after the fires. The rainfall this last winter was fickle and generally poor. One area that fared badly was the Little Karoo with Ladismith getting 50 mm of rain the whole season (normally they receive about 400 mm). A large area of the Swartberg Mountains behind Oudtshoorn and Ladismith burned last September – an area that had not burned recently before, so theoretically it should have had a good seed-store and should recover well.

In the area were huge stands of *Protea eximia* and *P. repens*, *Leucadendron barkeriae*, many restio species, *Pelargonium*, and several *Erica* species. In November we walked through the area and found nothing at all except a few restio species re-sprouting rather unenthusiastically, and a few plants of *Pelargonium ovale* that had escaped the fire. This was obviously a combination of the lack of any moisture in the ground, and the intense heat during September and October. We visited the area again in mid-February and this time some seed regeneration had occurred. Some time during the summer the area had had rain and temperatures suitable for seed germination. However, after counting protea seedlings (about 2-3 cm high) under and around old burned adult plants, we found an average of about two seedlings per adult, an extremely low regeneration figure. The area can probably expect its first winter rain in March or April, so perhaps more seeds will germinate then. But April is eight months after the fire, so just how many seeds will have survived rodent predation, extremely strong winds and high temperatures remains to be seen. Will all the re-seeders disappear and only the re-sprouters remain?

So fynbos does not always recover. The south-western Cape has now had two very hot and dry summers with an abnormally high number of fires and there are now very few areas of mature fynbos left. This is a potentially serious situation, as if we are confronted by another dry winter this year, recovery will be slow or non-existent, and the fynbos will be in danger. It also means that for the next eight to fifteen years we need no fires at all in the southern Cape. Given the fire record over the past two years, this is an unlikely scenario!

We feel that before one can answer the question 'Does fynbos need fire' one should define what sort of fynbos one is talking about, as all fynbos is certainly not the same. An easy division to make is between dry or arid fynbos as found in the Cederberg Mountains, northern slopes of the Swartberg, and the mountains of Namaqualand and the Richtersveld; and the well-watered fynbos of the Jonkershoek valley, the southern slopes of the Langeberg and the Outeniqua Mountains.



Poor regeneration of *Protea* seedlings after fire in the Swartberg.

It is debatable whether dry and arid fynbos needs to burn, ever. Walking through these areas there are always open spaces for new plants to germinate, the vegetation is usually short and one sees good recruitment of young plants in amongst the older vegetation. Old plants die, and new ones take their places. Regeneration after fires in these areas is excruciatingly slow and for adequate recovery of all species, a fire cycle of 30 to 40 years is probably required.

Or even better perhaps, no fire at all. One will not get the spectacular displays of bulbous plants flowering *en masse* after fire, but they still flower, and they still set seed and the seeds still germinate. Perhaps some species will suffer and disappear, but many other slow-growing species will benefit.

In the well-watered fynbos, the situation is quite different. Some of the bulbous species, which cannot compete with the thick mass of vegetation, disappear without fires as do many of the smaller perennials and shrubs. If this fynbos is to remain and the vegetation prevented from going to forest, then it probably does need to burn, but at a much longer cycle than is happening at present. In areas such as the de Vasselot Nature Reserve near Plettenberg Bay, the fynbos reaches mammoth proportions within a few years after fire. Many species are shaded out, and eventually the vegetation becomes reduced in species with *Leucadendron eucalyptifolium*, and restios such as *Elegia equisetacea* covering large areas. But fires every three or four years (as is happening now) is far too frequent, and is causing more damage than the lack of fires ever could.

So, the answer to the original question 'Does fynbos need to burn?' is: 'It depends!'. It depends on the type of fynbos and on the circumstances of the fire. Probably the well-watered fynbos can cope with fire as long as the interval between fires is sufficient to allow all species to get to seed-bearing age. But we feel that arid or dry fynbos does not need fire at all as it regenerates adequately without it. And if one has a combination of fire followed by drought in the next winter, fynbos cannot recover. As one cannot foretell what the next rainy season will be like, perhaps we should be more concerned when yet another fire flares up in the mountains.

The constant referral to fire being normal and necessary in fynbos has led to a sense of complacency amongst the public, managers of fynbos areas and botanists. We believe that the power of recovery of the fynbos and the beneficial effects of fire are grossly overrated in our already artificially disturbed surroundings. Perhaps in the past when

fires were less frequent and only occurred every fifteen or twenty or even thirty years, and when fynbos had time to reach maturity, then fire was beneficial, or at least, not as destructive. But unfortunately the situation has changed and management practices and attitudes need to change as well. Seedling survival depends on the conditions of the first year after fire, and so is particularly sensitive to fluctuations in the climate that we are currently experiencing. A dry season after a devastating fire will have a far greater effect on seedlings than on mature plants which can cope with an odd dry year. Thus the conservative route is to enable as many species as possible to reach maturity. Ideally if we are to maintain the species diversity, firstly the slowest growing shrubs should be allowed to flower and set seed, and secondly, the fastest growing over-storey shrubs should not be allowed to become too senescent.

The situation in the southern and south-western Cape at present is at the one extreme - there is virtually no mature fynbos anywhere in the entire floral kingdom. This is not something to be complacent about! Our feeling is therefore, NO FIRES, at least for the next fifteen or more years. ♡

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