



FUNGI FORAGERS

No.29: April 2022

OUR PURPOSE: TO RAISE AWARENESS AND INTEREST IN FUNGI OF THE CAIRNS REGION

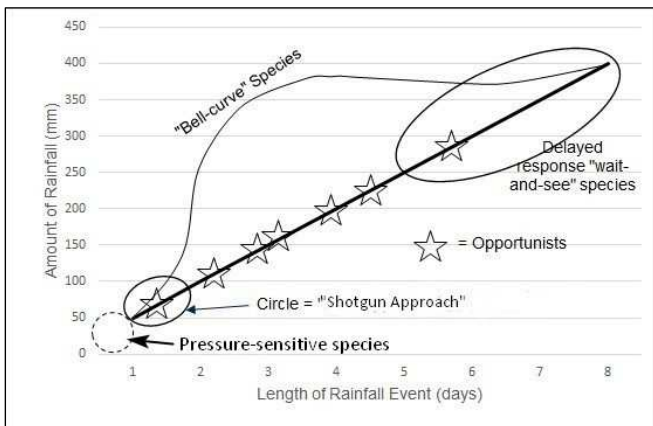
This newsletter is not associated with any club or organisation but is emailed free of charge to anyone who may be interested. Anyone who wishes to contribute to the newsletter with observations, anecdotes, corrections, comments or photographs is welcome to do so. Although this “newsletter” is science-based we try not to make it too “scientific”. We recognise that there are school children, bush-walkers and others just interested in fungi, and we hope this leaflet will become a medium for furthering that interest. **The emphasis is on fungal biology and ecology** rather than identification.

Barry Muir, Editor Jenn Muir

Field meetings to find interesting species of fungi (not necessarily edible species) are known as 'forays', after the first such meeting organized by the Woolhope Naturalists' Field Club, Herefordshire, England, in 1868 and entitled "A foray among the funguses" [sic]. The Woolhope Club was an early member of the British Mycological Society founded in 1896. (Wikipedia)

WHAT HAPPENED WITH FUNGI DURING “THE WET”?

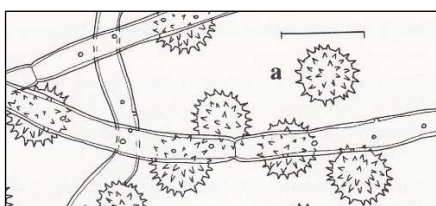
From Cairns Fungi Foragers (CFF) No. 27, November 2021 (special edition prompted by the approaching wet season), you may recall that there are basically five types of fruiting demonstrated by large fungi. The ‘pressure sensitive species’ produce fruit bodies **before** rains commence, being triggered by sudden drops in air pressure. The remainder were colloquially termed ‘shotgun’ species, opportunists, bell-curve and ‘wait-and-see species’. The diagram provided in CFF No. 27 is repeated below to jog the memory.



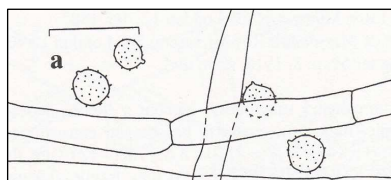
On time, and exactly as predicted, a whole lot of large fungi appeared in mid-January 2022 at the beginning of ‘The Wet’ here in Cairns, and clearly they had ‘read the book’ because they all appeared in the right order!

Appearing a few days before significant rains commenced in Cairns, was *Calvatia cyathiformis*. The one illustrated (next page) was photographed in a Nature Reserve north of Cairns, but they also reappeared near Cairns in the same place they appear every year just before it rains.

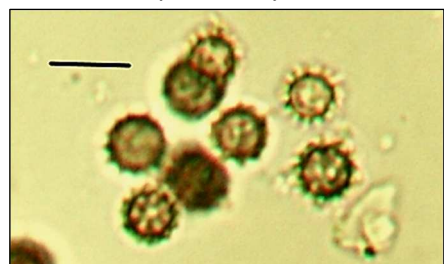
Whether they are *Calvatia cyathiformis* or *C. lilacina* has caused some debate in the past, but you decide.



Calvatia cyathiformis Bar = 10 mu



Calvatia lilacina Bar = 10 mu



My specimens Bar = 10 mu

The two diagrams are from Grgurinovic (1997).



***Calvatia cyathiformis* - I believe! A pressure-sensitive species**

The next group, the opportunists, appear after rainfall in any month. Many are wood decay fungi, but some appear on mulch. Common ones are the jelly fungi like *Tremella* and *Auricularia*. They rapidly disappear and then equally rapidly reappear after a dry period followed by another rainfall. Some are parasites on other fungi.

***Tremella mesenterica* – one of “the “usual suspects” of opportunists that appear each time there is a rainfall event**

These can be relied upon to stick their heads up after each burst of rain as long as the fall is more than just a shower.

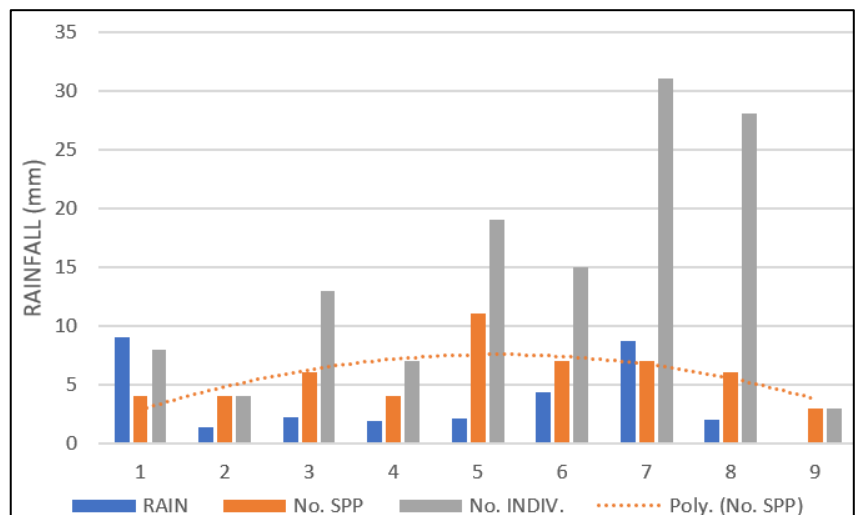


If the ‘break’ of rains is substantial, i.e. greater than, say, 20 mm (41 mm fell at Cairns Airport on 3 January 2022) the ‘shotgun’ species begin to fruit. These may last only a few days and then disappear, not to be seen again until the following year, or the next substantial period of rain after a long dry interval. Regulars up here in Cairns are *Pleurotus tuber-regium*, *Cymatoderma elegans* and *Leucocoprinus birnbaumii*. The latter, incidentally, is common around Cairns in rainforest areas, not just in flower pots.

***Leucocoprinus birnbaumii* cluster on the base of an Umbrella Tree (*Schleffera actinophylla*) in rainforest**

The next group, often the ones that attract attention, are the ‘bell curve’ species. These appear in small numbers of species and individuals after the break of rains and, if the rainfall period is lengthy, say 5-20 days, they gradually increase in numbers of species and individuals to a peak, then gradually decline in numbers of species, but fresh fruit bodies continue to appear, sometimes abundantly. The ends of the bell curve, either at the start or finish, may be truncated if rainfalls are erratic.

In the adjacent graph, 14 species of fungus have been recorded both in number of species and number of individual fruiting bodies, and plotted against rain that fell in **the previous 24 hours**. Each fruit body was tagged so that only **new** fruit bodies were counted each day. The triggering rainfall during the 24-hour period prior to Day 1, and the bell-curve in numbers is apparent. The



red dotted line labelled Poly. (No. spp) shows the overall steady increase then gradual decrease in number of species. Not really a “bell” but the principle remains the same. Note that number of **individual fruiting bodies** is distinct from number of species.



Possibly *Phaeoclavulina* aff. *ochracea* growing on a dead *Dillenia alata* trunk

Finally, the ‘wait and see’ species do not generally appear during the rainy season until right at the end, usually around March in Cairns, although this year things were different. The first rainy period of The Wet stopped on 30 January, then, although there were a few showers, there was a very long, very hot and humid period - referred to in the local press as a “heat wave”. Substantial rains did not fall again until mid-March and local fungi foragers half

expected the ‘wet season’ flush of fungi to recommence from scratch, but it did not. Yes, there were the usual opportunists, and even a few ‘shotgun’ and ‘bell-curve’ species, but in very low in numbers. What did appear, however, were the ‘wait and see’ species, in small numbers, but just as predicted. It would seem that, when the rain suddenly stopped at the end of January, they paused their development and then recommenced when serious rain set in during mid-March.

These ‘wait and see’ species are often, but not always, members of the coral fungi, and several are associated with dead wood. It is suspected that some of the woods, especially hard woods, take some time to absorb sufficient moisture to allow the woody tissues to break down and provide nutrients and for fruiting to occur - hence fruiting is delayed. The one illustrated above is possibly *Phaeoclavulina* aff. *ochracea*. *Entoloma* is another ‘wait and see’ genus in the Cairns Region and is sometimes overlooked because they often don’t appear until after rains have stopped and fungi-foragers have stopped searching.

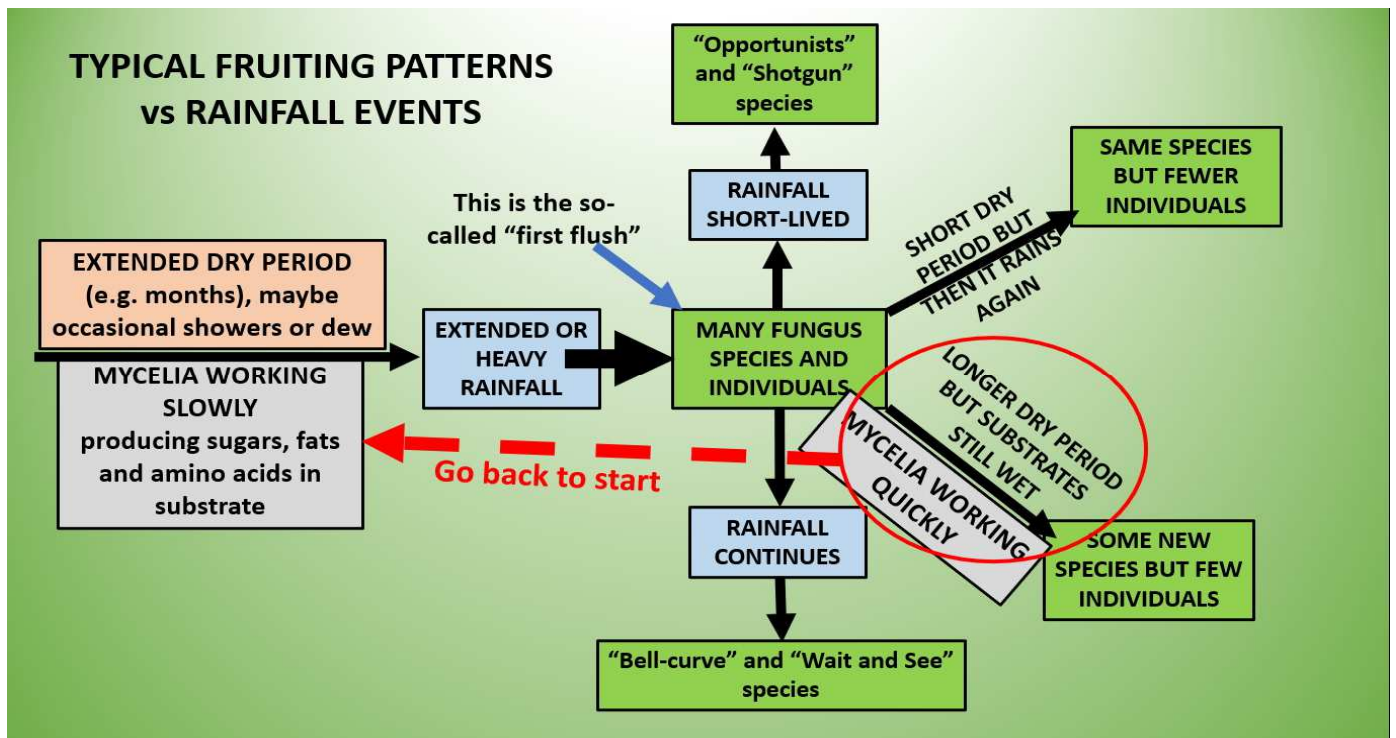


Figure 2. Simplified diagram of inter-relationships between fungal fruiting patterns and rainfall events

I’m hoping that some of North Queensland’s CFF readers have made similar observations in their local area over this last strangely erratic and dry wet season. I would be interested to hear about your findings and speculations.

NASTY FUNGI THAT MAY BE IN YOUR GARDEN

It is recognised that some decomposers may have a pathogenic phase, and some pathogens become decomposers after they have killed their host. Many tiny pathogen species may occur in your garden, but a couple are very conspicuous and have become especially apparent in the past year. One species (Plate 1 below), *Climacodon dubitativus*, (synonym *C. efflorescens*), grows to 50 cm or more in diameter and up to 30 cm high, and produces millions of spores, and is thus a dangerous pathogen to spread by wind-blow.

There are also several species of pathogenic decomposers: species that attack and kill plants but do so slowly. Many are of the well-known Genus *Ganoderma* and do pose a risk, but are easily removed from trees and thus their spread is manageable, although the tree usually dies eventually. You can slow spread of pathogenic fungi in your garden by removal of the fruiting bodies **as soon as they appear**. This is a simple process of just using a knife or tomahawk to cut the fruiting bodies off the host (usually a palm or tree), bagging the fungus and disposing into the rubbish bin - NOT into your compost heap! Saws, pruners, tomahawks and secateurs should be sterilised after dealing with a diseased plant.

The least conspicuous, and therefore more dangerous because it spreads by root contact, is the brown root rot once called *Phellinus noxius*, but now called *Pyrrhoderma noxium*. Once plants, usually trees, are infected, little can be done to prevent their ultimate demise. Inoculations of the roots with another fungus, *Trichoderma harzianum*, sometimes slows the spread of the *Pyrrhoderma* and has been successfully trialled to treat brown root rot.

Plate 1. *Climacodon dubitativus*



Plate 2. *Pyrrhoderma noxium* growth on tree trunk



An effort should then be made to fertilise and, if necessary, water the host to ensure its best possible health. In most cases plants attacked by pathogenic fungi, if well cared for, may survive for tens of years, but make sure the fungi don't get the opportunity to spread their spores.



TO MULCH OR NOT TO MULCH – AND HOW MUCH MULCH?

Television gardening programmes and nurseries push garden bed mulching as vital to reduce weeds, retain moisture and prevent erosion, and they are right!

However, some testing of mulch beds for water penetration has shown that 5 cm depth of typical mulch, e.g. shredded mixed vegetation, may reduce rainfall and irrigation input to soil around plants by about 60% and 10 cm of typical mulch sometimes up to 96%. Coarse, hard mulch such as wood chips has less impact because the water runs off the chips onto the soil. Thick layers of straw may stop most water reaching the soil because the straw is

absorbent. Long, heavy, rainfall events are needed before the moisture actually penetrates through deep straw to reach the soil.

The cost of mulch and irrigation can be reduced by keeping mulch to less than 5 cm depth. Heaping mulch around the base of trees also increases the risk of lower trunk and root parasites.



NUMBER OF FUNGAL SPECIES EACH MONTH – DATA FROM CAIRNS

In the Cairns Botanic Gardens Precinct (the Precinct), 169 taxa of large fungi were recorded between January and December 2020, and a further 55 were added between January and December 2021: thus a total of 224 macrofungi species have been recorded in the Precinct up to the end of December 2021. Another six species have already been added in January this year (2022), regardless of the dry conditions, bringing the total of macrofungi species to 230 to end January 2022. This was despite several Covid-19 lockdowns in 2021 which prevented or slowed regular searches of the public areas. In addition, owing to the large size and complexity of the Precinct, not all habitat types received equal attention.

The months in which macrofungi were observed in the Precinct during 2020 and 2021 are illustrated in Figure 1 below. Mean monthly *long-term* rainfall data are extracted from Bureau of Meteorology data for Cairns Airport as at 10 February 2022. Cairns Airport weather station is located 3 km to the north-east of the Cairns Botanic Garden Precinct. Long-term mean monthly rainfall is **divided by 10** to bring the data into a visual scale comparison with the number of species data.

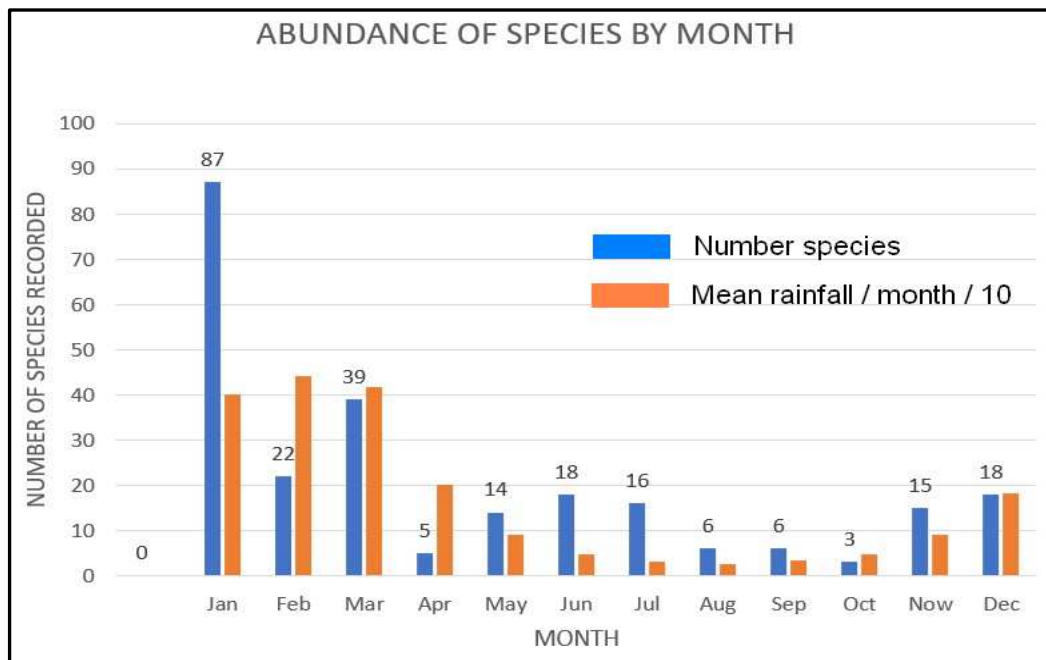


Figure 1. Number of species per month in 2020 and 2021 combined (blue columns) - note that some species are in common, occurring in more than one month - compared with long-term mean monthly rainfall divided by 10 (orange columns).

Fungi can occur in any month following rain, but the number of species rises dramatically in January with the first really substantial rains of the wet season while the soil is still warm. This is the so-called fungal ‘first flush’. The rainfalls in November and December, preceding the January heavy falls, are probably vital to allow the fungal mycelia to accumulate sugars, fats and amino acids prior to heavy fruiting. This is supported by the observation that the number of fruiting species drops off rapidly by February, the ‘shotgun’ species and opportunist species (see article above), having fruited rapidly.

Appearing at the same time, but increasing steadily and then gradually dropping off in numbers of species are the ‘bell curve’ species. These are the species that tend to dominate in April to August, although a few appear earlier and a few

later. The species that do not appear until March or April, despite adequate rains, are the 'wait and see' species, mostly coral fungi and some *Entoloma*.

In the period May to November, the majority of fungal species in the Cairns Botanic Garden Precinct, are those stimulated by garden irrigation and are not specific to rainfall requirements. Particularly in June, the coldest month, species such as *Agaricus augustus*, *Dacryopinax* spp, *Peziza vesiculosa*, *Russula* aff. *erumpens*, and some of the slime moulds, appear. These species are also comfortable in cold climates in the southern eastern states and south-west Western Australia. The fungi then seem to 'shut down' from August to October around Cairns, probably accumulating nutrients in preparation for the oncoming January surge.

Interesting, I think, is that the pattern of fruiting discussed in the article "What Happened with Fungi During The Wet" (above) is also reflected, more or less, in the annual fruiting/seasonal rainfall pattern. Admittedly my observations are based on only two years of detailed data and five years of casual data in the Cairns Region, but I recollect a similar pattern from many tens of years of observations in south-west Western Australia, although the 'wet season' in the south-west was mid-year. Three years of observations in the Kimberley Region of Western Australia followed the same pattern as here in Cairns.

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