

Waging war against *Dioscorea*

It's Friday 1:30pm, and a motley crew consisting of Gardens staff and contract workers and Ngee Ann Polytechnic cadets assemble at the forest edge along Liane Road. Armed with only 2 small changkols and a stack of black garbage bags, this army of 6 might not look much, but our quest is formidable – to rid our precious primary rainforest of one of its most invasive and damaging weeds - *Dioscorea sansibarensis*.

Profiling the enemy

Originally from Africa, *Dioscorea sansibarensis*, also known as Zanzibar yam, is a climbing plant that forms large starchy underground tubers and propagates vegetatively through the production of aerial bulbils. Although some tribes in Africa are known to treat and consume these large underground tubers or 'yams', the entire plant is so toxic that its much more widespread use in central and eastern Africa is as a hunting poison, or as a poison to commit murders or suicide. Other *Dioscorea* species have similar biological and chemical characteristics (and hence a similar weedy nature in introduced environments) and besides being used as a poison, are also used in some traditional African medicines. Interestingly, *Dioscorea* also contains the steroid diosgenin, which is easily converted into progesterone and was used as an oral contraceptive in the 1940s.

In the Gardens, *Dioscorea sansibarensis* has managed to get a foothold in many areas of the forest, in particular, disturbed areas such as along paths and roads, as well as clearings due to tree fall. When left unchecked, this fast-growing climber spirals up tall trees and completely smothers the canopy with its characteristic 'bat-like' foliage. It showers the ground with thousands of aerial bulbils, and once it has established in an area, the forest has little chance of recovery without human intervention. *Dioscorea sansibarensis* has never been recorded to flower or fruit in Singapore – so without any form of seed dispersal, its invasion is wholly dependent on the physical spreading of aerial bulbils. Moreover, these bulbils do not stay dormant for long, and will germinate in a matter of weeks. Taken together, these facts



The characteristic lobed leaves of *Dioscorea sansibarensis*



Ngee Ann cadets with their catch for the day. So far, the largest underground tuber found in the Gardens Rainforest weighed in at 22kg!

expose the vulnerability of *Dioscorea*, and make the notion of eradication possible.

Operation Die Dioscorea

Although there have been efforts to curtail the spread of *Dioscorea* in the Gardens Rainforest in the past, these weeding exercises were not done frequently or thoroughly enough to fully eradicate the bulbils. As a result, *Dioscorea* still runs rampant. So with the aim of restoring the forest to its former health, we optimistically decided to launch a full-on attack in a project fondly referred to as Operation Die Dioscorea. The plan itself was simple - continuously remove all *Dioscorea* from each area of the forest until the 'bank of bulbils' in the ground has been completely exhausted. In reality however, this has proved to be very challenging as *Dioscorea sansibarensis* has an indomitable will to live. We have learnt in the course of this operation that: underground tubers must be completely removed because even the smallest sliver of tuber will re-sprout; large plants produce bulbils; small plants produce bulbils; even plants in the treetops that we supposedly 'killed' by hacking away their lower halves and removing the tuber continue to produce aerial bulbils for at least a month as their final act of defiance!

Light at the end of the tunnel!

Fortunately, time is on our side as no

matter how hard it tries, *Dioscorea* bulbils cannot grow above 'grabbing' level (1.5m) in a matter of days. This is certainly true for aerial bulbils as they are generally no larger than a small potato; however, large tubers left in the ground produce new thick stems at an alarming speed. We noted that within a week, a record 22kg tuber had already sprouted two large stems 3cm in diameter and 4m in height. This just highlights the importance of removing all the large tubers as soon as they are detected. We have found that returning to the same area every 2 to 4 weeks is ideal as it allows sufficient time for new bulbils to germinate, but not enough time for them to grow out of reach. Three months and 760 man-hours into the campaign, and we have removed a total of 513 garbage bags (about 3.7 tonnes) of *Dioscorea* from roughly one third of the forest. Progress is slow, as old areas constantly have to be re-visited, but it is encouraging to find the amount of *Dioscorea* in each area drastically reduced with each visit. At this rate, it will take another year of tri-weekly *Dioscorea* removal sessions before we've finally removed this scourge from the forest, but for the sake of the forest, we are certainly determined to do so.

Thereis Choo
Living Collection

Photos by Thereis Choo