prominent. Descriptions of a feature, essentially the vestigial post anther lobe at the back of the anthervary in the literature. Cheeseman (1910: p.177) remarked 'occasionally there was evidence of a slight crest connecting the lateral lobes' and added 'the column wing scarcely crested in the back behind the anther". Jones (1993: p.299) described the post anther lobe as 'short, not hooded, sometimes notched with a dense grape-like cluster of calli, sometimes flanked by short accessory lobes'. Jones (2006: p.253) repeated this description and reiterated 'a dense grape-like cluster of globose glands'. Rogers (1930) describing *T. daltonii* reported the middle lobe much shorter (than the column) or obsolete 'without any dorsal crest'. Calli so far examined on flowers of *T. matthewsii* in the Far North appear to be quite sparse. This presents an anomaly that would benefit from further study.

A decline in the number of plants is now becoming a major feature of my data and suggests that the populations are entering the disappearing phase common to orchids. Surveys of adjacent populations will be carried out to determine whether there are still viable populations, (i.e. with adults to provide seed) in the areas surrounding the monitored areas, to ensure the species presence in this, the last habitat of *T. matthewsii* in New Zealand.

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Ethnobotany, germination and growth of *Eleocharis sphacelata*

Mieke Kapa

Eleocharis sphacelata, distributed over Australia, Papua New Guinea and New Zealand (predominantly in the north of the North Island) occupies the littoral margins of fresh water wetlands and lakes. It is an emergent sedge that displays morphological changes with increasing water depths, enabling it to out-compete other wetland macrophytes. To assist revegetation efforts with *Eleocharis sphacelata*, research was conducted to (1) record traditional ecological knowledge held by users; (2) determine the best methodologies for germination of seed; and (3) develop techniques for improved transfer of juvenile plantlets.

Ethnobotany: Kuta (Maaori name for *Eleocharis sphacelata* commonly used by Ngaapuhi, alternatively paopao is used by Te Arawa) is a culturally significant wetland plant that once harvested and prepared was traditionally woven into items such as cloaks, maro (aprons), paatae taua (mourning wreaths), and more commonly taapou (mats) (Kapa & Clarkson 2009). Cultural uses, conservation and ecology were investigated by exploring published information and Traditional Ecological Knowledge (TEK) held by Maaori (communicated to the researcher via interviews). Research identified that kuta, together with other wetland plant species, was used traditionally in commonplace events, rituals and tikanga, and that although kuta has a reduced everyday contemporary use, there is still a significant living repository among Maaori, particularly weavers, of TEK relating to this plant and that use of kuta within a cultural context is still practised and valued. Reduced access to, and drainage of, traditional kuta harvesting sites is a concern which could partially be mitigated by using culturally appropriate restoration techniques and methodologies in degraded locations.

Seed germination: Water depth and seasonal responses for seed germination may have implications for management practices to increase germination potential. Although *Eleocharis sphacelata* produces on average 75.3 seeds per seed head (Bell 2000) many commercial operators have had difficulty (as with many other wetland plant species) with low germination rates. Research undertaken attempted to

determine treatments that enhance germination rates included subjecting fresh and stored seed to a combination of seed coat treatment and alteration of O_2 availability (by varying water depths) over a period of 11 months. This research conclusively found that sowing fresh seed, after an over-night soaking in bleach, under various water depth, from damp conditions during initial germination flush to 15 cm deep (in preparation of germination resumption in the following spring), increased germination rates by 35%.

Fig. 1. Habit of *Eleocharis sphacelata*. Rotopotaka, Bay of Plenty. Photo: Mieke Kapa.

Growth and transplanting: Emergent *Eleocharis sphacelata* culms extend, from a rhizome growing up to 3.5 m below the water surface, for photosynthesis and gas absorption (Sorrell & Tanner 1999). Less buoyant culms occur when water level is consistently shallow resulting in an increased density of fine wiry culms with the plant transferring its biomass allocation to the rhizomes below ground, leading to the culms bending, warping and collapsing if water table is below ground level (Asaeda et al. 2006; Sorrell & Tanner 2000). Methodologies for plant transferral were investigated to increase transfer success in restoration projects. A trial design using 3 wetlands and two different juvenile plantlet types (seed grown seedlings and vegetative propagules) were planted at three different water levels and monitored for 11 months. Seed grown seedlings produced greater mean survival rates, culm number, length and diameter under 15 and 30 cm of water; however, vegetative propagules had better coping strategies, thus increased survival, under damp conditions.

Fig. 2. Seed of *Eleocharis sphacelata*. Photo courtesy of Barry O'Brien.

Pointers to further studies: Future collaborations between scientists and Maaori, with kuta and other wetland sedge species, will demonstrate further potential for knowledge transfer in such fields as conservation, ecology and taxonomic classification. More work is required to establish optimum seed management strategies and beneficial seasonal timing transfer of juveniles. Genetic differentiation of localised provenance and nationally distributed swards needs to be investigated to provide guidelines for ecosourcing. Further research into the apparent ability of *E. sphacelata* to have dual germination potential under increased water depths over one season will provide an understanding into the germination strategies and ecological relationships with fluctuating water regimes.

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Going Underground: *Dactylanthus taylorii* in Auckland

Bec Stanley

Dactylanthus (*Dactylanthus taylorii*) is New Zealand's only fully parasitic flowering plant. It grows underground attached to the roots of forest trees from which it obtains all its nutrients. It looks very different to most plants as it is just a warty tuber which does not need leaves to make food. It grows on a range of common shrubs and small trees either at the edge of or in regenerating forest e.g. lemonwood (*Pittosporum eugenioides*), kohuhu (*Pittosporum tenuifolium*), mamangi (*Coprosma arborea*), mahoe (*Melicytus ramiflorus*), lancewood (*Pseudopanax crassifolius*), and up to thirty other trees and shrubs. Dactylanthus can grow anywhere its host can i.e. from near sea level to over 1000m (Ecroyd 1996) and can be found on almost any topography including flat sites, gullies or ridges. Dactylanthus flowers are pollinated by the short tailed bat, but it is not dependant on bats, and today there are no longer many sites where these two species coexist.

Under Threat

Dactylanthus is threatened and without management would most probably decline to extinction. Possums, rats and pigs destroy the flowers and prevent seed production. Pigs can also kill plants by rooting out the whole tuber. Protecting dactylanthus involves intensive pest control or caging of plants to prevent browse. In the past people also directly threatened dactylanthus by digging up "woodroses" which were once a fashionable ornament. Woodroses are not the dactylanthus, or its flower, but the deformed tree root of the host which is dug up to reveal a scar where the parasite attaches itself to its host.

Dactylanthus in the Auckland Region

Dactylanthus has not been seen on the mainland of Auckland since the mid-1960s. The only specimen of dactylanthus collected in Auckland was by Katie Wood from Huia in 1953 (AK 30502). Ex-Auckland Regional Council (ARC) Senior ranger Bill Beveridge knew dactylanthus from Waiatarua in the Waitakere Ranges in the 1960s (pers comm.), and his sister reported it from Laingholm (Joan Glasse pers. comm. 2008). Lucy Moore records it was reported to her by Omaha locals as being found on Mt Tamahunga in the 1920s (Moore 1928). The earliest record for Auckland is from the forest near the source of the Hoteo River (Cheeseman 1914). There are anecdotal reports from Great Barrier Island recently given validity by a fossil pollen record (Yanbin Deng pers. comm. 2001). Little Barrier Island is the only site in the Auckland region where dactylanthus is still currently known.

Dactylanthus on the Auckland Mainland

Dactylanthus is hard to find due to its underground habit. The best time to look for it is the two months during autumn when it is flowering and the inflorescences are visible above the soil surface. Could dactylanthus still be on the mainland in Auckland but its cryptic habit means it is not encountered? This is possible and indeed many aspects of its ecology make it well-suited to long term survival e.g. its lifespan is as long as its host tree, possibly over 100 years, and it also has long-lived seed. There are plenty of suitable habitats in the region. Encouragingly there have been several new populations found elsewhere in NZ over the past decade, e.g. in Puketi Forest in Northland, where dactylanthus hadn't been known before. For all these reasons it is likely that there could be some isolated, probably struggling in the presence of browsers, populations of this very secretive rare plant remaining in Auckland that remain to be discovered.

Chasing Old Records

The usual way to survey for most rare plants is to look in suitable habitat in places where that plant was known in the past. The assumption behind this is that all locations where a rare plant grows were recorded (either in the literature or by a specimen). If locations of some plants are kept secret to prevent collection (by people) this hampers the usual survey approach of identifying and chasing up old records. It was this fear of collectors removing dactylanthus for its woodrose that resulted in it going "underground" not only in its lifestyle but in the literature. I have been told that local botanists kept locations secret for this reason. Unfortunately now we need to find dactylanthus to protect it from more insidious threats, such as animal browse, and this secrecy impacts on our ability to protect it.

Some records, such as Katie Woods Huia record, appear to deliberately protect the location by noting an ambiguous and imprecise location such as "Huia Dam". Not only are there are two dams (although one was only under construction in Woods time) but the Huia valley is huge.

Collecting dactylanthus is nowhere near as common a pastime as in the past. Often ex-collectors take Department of Conservation rangers back to locations they dug dactylanthus up and now these