The environmental education needs of school pupils and their teachers today are resources they can use which are locally based. It is the environmental awareness and sensitivity of young people living in their own communities which is at stake. It will only be when significant changes are made at this level that changes in attitude at a regional or national level will become apparent.

References

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Seed Set and Germination in *Pachystegia*

M.J.A. Simpson and B.P.J. Molloy

It is well known that seed set is poor in Compositae and particularly so in a good many New Zealand representatives of the family. Germination too is often unpredictable. With selected seeds of *Pachystegia insignis* var. *minor* collected from a garden plant growing at Botany Division, Lincoln, ex Kekerengu, Kaikoura coast we have had good and rapid germination with fresh seeds. Last year Brian Molloy drew attention to large numbers of volunteer seedlings near this plant. For the species, (*P. insignis*) L. Metcalf (1972) wrote that in the Christchurch Botanic Gardens self sown seedlings appeared in quantity beneath the bushes in the autumn. Self sowing has also been reported at Otari Native Plant Museum, Wellington (Fisher, Setchell and Watkins 1970) but the same authors mention that an Auckland gardener, Mrs. Bedford "has grown pachystegias from cuttings although I understand she has never succeeded in getting the seed to germinate". Recently Mr. Ian J. Tweedy of this society remarked that although he has grown and flowered a healthy plant of *P. insignis* for sixteen years in his garden at Bryndwr he has never had a volunteer seedling and "seeds" collected from his plants have failed to germinate whilst seeds acquired from other sources have been grown successfully by him.

This year Brian Molloy brought in six heads from each of his garden plants of *P. insignis* and *P. insignis* var. *minor*. We counted the filled and empty seeds in each head and later looked at seed heads from plants of both taxons growing in their natural habitat on the Kaikoura coast and at Molesworth and from two other gardens (see Table 1). There are more florets in the larger capitulum of the species than in the variety but the variety sets a larger proportion of good seeds than the species. In one garden collection of the species (d) no seed

had been formed and in another (e) only a very small percentage of the seeds were good. Probably we can regard the Tweedy plant and the Bedford plant both of P. insignis as non-seed producers. Flowering in P. insignis is usually a good month ahead of the variety and in both the main flowering occurs in one flush. In natural habitats seeds can be ripe on P. insignis as early as January and for the variety February is a generally good month to collect seeds. Brian Molloy has noted that in his garden P. insignis flowers throughout January and P. insignis var. minor from mid January to the end of February. Seeds had ripened in both by 12th March, 1978 and he found that the variety tended to shed its seeds before the species. On the Kaikoura coast seeds had been shed from the majority of plants inspected by 24th March, 1978 but it was possible to collect enough heads for the counts in Table 1. Also in the Awatere Valley and at Molesworth most seeds had been dispersed by early April.

As the seeds ripen, the calyx, cup-shaped at flowering time becomes flattened. This causes the receptacle to expand thus facilitating the release of seeds. In the collection from two garden plants made in May (d&e) where there were few or no seeds formed the calyx was still cup-shaped with the "seeds" enclosed intact. The emptied seed heads are quite distinctive for the species and the variety. In the former the straw coloured lustrous phyllaries are much more numerous and curve backwards and to one side from the convex receptacle. In the variety the fewer pointed phyllaries remain stiff and straight around a flatter receptacle. Both maintain their distinctive characters in cultivation and this factor together with differences in floral morphology, seed production and other morphological differences and ecological preferences suggests that there are two good species involved.

Whether the failure to set seed on some plants is due to lack of suitable pollinators, weather conditions or to sexual dimorphism is not known.

Germination

In laboratory tests at 25°C constant and in full daylight, selected fresh seeds give a high germination percentage. For instance seeds of P. insignis (c) gave 82% germination mostly within two weeks and P. insignis var. minor (h) 88% also within two weeks. Tests from the garden plant at Lincoln (P. insignis var. minor) gave similarly high percentages. However, of 25 seeds tested from P. insignis (e) only 8 (32%) germinated and the emergent seedlings were weak. In tests over a range of temperatures in full daylight P. insignis (c) germinated at temperatures ranging from 0° to 27.5°C and the variety minor (h) from 0° to 30°C.

Fisher et al. (1970) after giving instructions for seed sowing say "the seed should germinate in a few months". In the laboratory conditions described above germination begins within a week, reaches its maximum in about ten days and is completed within one month.

To test the duration of viability, seeds of P. insignis var. minor collected from the garden plant at Lincoln and stored in paper packets at room temperature for periods ranging from 28 months to 99 months were tested at 25°C in full daylight. Also seeds from Brian Molloy's garden of P. insignis and of the variety minor were tested after being stored for 15 months. P. insignis after 15 months storage gave 68% germination

P. insignis var. minor after 15 months gave 72%. Seeds from the garden plant at Lincoln after 28 months gave 64%, at 40 months 32%, 52 months 4% and after 99 months no germination.

Shrubs of Pachystegia on cliffs of the Kaikoura coast have unfortunately been exposed to weedicides as a result of the spraying of broom on adjacent sites and many plants have suffered as a result. I (M.J.A.S.) collected some formed seeds from a plant showing the effects of spraying south of Rakautara on 24th March, 1978, but obtained no germination in a test at 25°C in full daylight.

TABLE I Seed counts of good and empty seeds in individual heads. Collections from one plant in each case:

		Filled seeds	Empty seeds
(a)	Pachystegia insignis		
	Sth of Rakautara Stn., near Caves,	115	184
	Kaikoura 24.3.1978	158	160
		78	213
		89	226
		59	240
		39	99
		92	139
	One head full of insect larvae	91	173
	and seeds eaten		
(b)	P. insignis		
	c. 5 km north of Kekerengu, Kaikoura	208	211
	coast 24.3.1978	375	146
		121	367
		247	226
	One head not fully developed	249	196
(c)	P. insignis		
	ex Garden, B.P.J. Molloy	195	140
	Riccarton 12.3.1978	103	219
		189	151
		95	222
		88	177
		217	167
(d)	P. insignis		
	ex garden, Mrs. Powell	0	313
	Wallacetown, Invercargill 29.5.1978	0	222
	Collected by Graham Loh	0	202
		0	240
		0	175
		0	247

TABLE 1 (Continued)	Filled seeds	Empty seeds
(e) *P. insignis*		
Seedling collected at Flaxbourne	2	219
and grown in garden, L.B. Moore,	4	346
Lincoln 28.5.1978	1	240
	0	340
	5	317
	6	368
1 head had 9 ladybirds. Another had some.		
P. insignis		
Woodside Creek, Kaikoura Coast		
E.J. Godley Feb. 1956		
Plant 1	152	214
Plant 2	285	135
(f) *P. insignis* var. *minor*		
Nth of Raukatara Stm, Kaikoura	172	5
24.3.1978	156	23
	110	9
	188	15
	147	21
(g) *P. insignis* var. *minor*		
Hurunui River bluffs L. Stemmer		
18.2.1975		
(Mass collection of several heads)	822	447
(h) *P. insignis* var. *minor*		
ex garden, B.P.J. Molloy	176	17
Riccarton 12.3.1978	177	19
	158	15
	172	12
	133	12
	169	9
(i) *P. insignis* var. *minor*		
Willow Stm, Molesworth 16.4.1978	49	117
	33	96
	93	43
Seeds in most heads dispersed by this time.		

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A REVISED FLORA OF LITTLE MOUNT PEEL

B.P.J. Molloy and A.D. Campbell

In recent years the Canterbury Botanical Society has held two weekend camps at Peel Forest, South Canterbury. At the first of these, on Show Weekend 1973, a checklist was made of the plants found on the summit of Little Mount Peel (1311 m), a small area covering no more than 10 m of elevation between the Tristram Harper memorial shelter and the summit trig.

On 22nd March, 1978 we examined the same area with Dr. David Galloway, with the aim of making a more complete list of the higher plants and ferns, and also to survey the lichens. In this paper we list all the plants now known to grow on the summit of Little Mount Peel, setting them out in the same order as before (see Metcalf and Molloy 1974) and including the mosses and liverworts (Macmillan 1974, 1975). New records are marked with an asterisk and corrections, name changes, etc. are indicated by enclosing the abandoned names in brackets. In addition, the presence of each species on one or more of the main aspects described below is shown in the list. The suitability of these slopes for lichens is discussed briefly elsewhere in this journal by Dr. Galloway who also lists the macrolichens for the area.

The summit of Little Mount Peel has weathered into a pyramid-like apex with four steep unequal sides facing in different directions. The north-facing slope is the largest and also the driest, with much loose rock and bare ground. The plant cover is discontinuous and the dominant species is the narrow-leaved snow tussock, Chionochloa rigida. Other prominent species are the spaniard (Aciphylla aurea) and a cotton plant (Celmisia spectabilis var. magnifica).

The east-facing slope is smaller and not quite as dry. It carries a deeper, more stable soil which supports a continuous cover of the narrow-leaved snow tussock, but with other species of tussock and cotton plant occurring as well, along with many shrubs of Dracophyllum. The southeast aspect, the smallest face, is a moister version of the above and carries the heaviest tussock vegetation. However, the southwest slope is the wettest of them all, and its many rock ribs and near-vertical banks support a relatively rich and varied flora.