



41 (a)



41 (b)

**Figure 41(a), (b) Trypot stand C: (a) Interior view following removal of *Olearia* and flax cover and some removal of *Asplenium oblongifolium*, note rounded shape of trypot seating and chimney at rear; (b) the northern face, note render surface and unstable (not interlocked) stonework at right. The stand has subsequently been covered by a temporary roof.**

Terrace 7 (at the foot of slope in the regenerating hardwood forest) has the following vegetation cover: **tītoki** (*Alectryon excelsus* var. *excelsus*), swamp coprosma (*Coprosma propinqua*), kohekohe (*Dysoxylum spectabile*), hangehange (*Geniostema rupestre* var. *ligustrifolium*); kawakawa (*Macropiper excelsum* subsp. *excelsum*); and **kaikōmako** (*Pennantia corymbosa*). The ferns are: shining spleenwort (*Asplenium oblongifolium*) and hound's tongue fern (*Phymatosorus pustulatus*).

### ***Management***

Karaka/kohekohe forest should be allowed to develop in the vicinity of the terraces and grave, but any large tree or shrub species which may appear on the features themselves should be removed by hand. Ferns, sedges and shrubs with a less extensive root system should be allowed to colonise sites but not standing structures. In the zone of the karaka forest, seedlings need to be weeded before they become too established. Any trees, shrubs, or flax should be cut from those free-standing ruins with earth/mud mortar. The shrubs will need to be swabbed with a brushweed systemic herbicide.

In February 1995, shrubs and ferns had been removed from the fireplace and trypot stands. Karaka and kohekohe seedlings had been selectively removed from terrace and house floors. Try-pot stand C was partially prepared for ethyl silicate treatment to be applied by Ian Bowman and Works Corporation specialists. The stand was temporarily roofed for the winter of 1995 to allow the existing mortar to dry out. Careful removal of almost all vegetation will be needed to allow the silicate treatment and re-grouting. This will expose the structure very clearly to view from the adjacent track. Signs seeking visitor cooperation in protection have been installed. The other stone heaps may be dismantled after documentation, to allow access to the earth mortar surfaces, and then re-constructed. Earth mortar will be re-grouted, where it is failing, and the whole treated with ethyl silicate, which bonds to the clay mortar and hardens and waterproofs it. Trypot stand C will be the main priority.

## 6. DISCUSSION AND CONCLUSIONS

### 6.1 Landscape-scale issues

All sites are at the mercy of their local and regional ecological influences, and indeed in a short report, it is difficult to know quite when to cease describing the relevant local or district factors that bear on management. In our visits to Auckland, Northland, Canterbury and Otago, we were presented with issues of landscape design that are more under the control of the reserve manager than those in the previous report (Case Studies I, Jones and Simpson, 1995), e.g., the Auckland cones, or the inshore islands of Motutapu or Moturua. We believe the following generalisations are helpful.

- Archaeological features should be evaluated on a regional basis or within each site and a decision made as to which areas are high priority for interpretation and preservation;
- Landscape evaluations covering human usage, desirable tracking, interpretation objectives, vistas and viewshafts (to, from, and within the site), existing forest-patch enhancement, weed threats and control options should be made;
- Fire control plans should be developed;
- Define areas which should be kept in mown grassland or grazed grassland (allow for fencing pattern);
- Define areas which may be allowed to develop into a low shrubland or fernland, in conjunction with the areas of open grassland;
- Deal with "problem" trees (aged, dangerous, undesirable);
- Enhance and expand existing or potential treelands to fit in with landscape and site protection objectives.

### 6.2 Native grasses

Several cases have been noted whereby exotic grassland has been progressively colonised by indigenous species which are easier to manage. We believe that research on the use of native grasses may lead to their use where open landscape is desirable. Station Bay pā on Motutapu Island, fenced for 30 years on archaeological and coastal scenic values, is an excellent example of native grass protection.

Pātītī (*Ehrharta stipoides*, meadow rice grass) is widespread as native grassland, and in shrubland and secondary forest throughout New Zealand. Fifty-four collections are maintained under formal trial at Kaikohe, mostly from Northland and Waikato (Woods, 1994, pers. comm.). We have observed pātītī as far south as Banks Peninsula, where it is spreading fairly rapidly into exotic grassland. Specimens from different provenances vary in size, the degree of spreading rhizome formation, leaf colour, and the time of

flowering. Only certain provenances form stolons that lead to sward formation. **Pātītī** has excellent staying power under the threat of invasion by pasture species and is drought tolerant. It has potential as an "amenity cover" the requirements for which are persistence, sward formation and low maintenance. Our observations strongly support the contention that it is a valuable surface protector on **pā** sites where mowing or grazing is disadvantageous, where shrubland/forest establishment would be damaging, or where open forest or shrubland needs a shade- and acid-tolerant stabilising cover at ground level.

*Danthonia* (*Rhytidosperma* spp.) will be useful on dry infertile sites, but does not tolerate intensive grazing.

Other grasses (e.g., plume grass *Dichelachne crinitum* and the blue wheatgrass *Elymus solandri*) may be suitable if artificially established.

All the grasses need to be better understood in relation to their behaviour in former or retired pasture grass areas. If grazing is to continue, or if the establishment of native grasses places archaeological values at risk, the option of improving the conservation value of exotic pasture grasses must be considered. In relation to risk, the process of natural re-establishment of **pātītī** (*Ehrharta stipoides*, meadow rice grass) that we have observed at Station Bay and at Onawe is heartening.

Some specific characteristics of these grasses, the varieties, physiology and ecology of which are rather poorly known, are contained in Appendix 1 (after Wood, 1993).

### **6.3 Weeds**

Weeds are a major feature of **pā** sites in Northland and Auckland. Some are common elsewhere in New Zealand (gorse), others specific to the north (privet, *Polygala*). Sometimes they are useful to the immediate soil-surface conservation problem (privet, *Araujia*, kikuyu) but frequently they bring other problems (human health, aggressive ecology, unnecessarily complicated management, inappropriate for historic sites, costs of control). As a general principle, weeds that serve no purpose (e.g., balsam at Ruapekepeka), inhibit natural generation (e.g., *Tradescantia*), or obscure interpretation (e.g., kikuyu at Site #8, Urupukapuka) should be removed or an ecological process induced that removes the problem, such as reversion to shrubland and subsequent shading. But where removal is costly and the weed can be incorporated into the ecological process, then it should be left; e.g., the Italian buckthorn (*Rhamnus*) on Motutapu. A containment rather than eradication policy might be better, in general this will cost less and run less risk of a reduction in the conservation status of the site.

### **6.4 Native forest**

**Pā** features and "atmosphere" can be well served by native forest, especially once a "gallery" effect (relatively unimpeded visibility of the forest floor) is achieved. This depends on the species: **kānuka**, karaka, mangeao have all proven to be good after a few decades. There is a need for research on the specific effects of native forest, and the

specific virtues or problems of particular tree and shrub species. In the north, we saw little of the destabilising effects of canopy damage caused by wind that we observed in Taranaki (Jones and Simpson, 1995: 104-109). This cannot be simply the lack of periodic severe gale winds, but more the character of the trees that quickly establish to form a canopy. In Taranaki, for example, rewarewa is an important early canopy tree, but it is very prone to wind damage. We would not recommend its usage and perhaps it should be selectively removed from forest cover on archaeological sites, despite the excellent ground-cover properties of its fallen leaves.

An enduring debate is whether **pā** should be managed in grassland or, through a series of intermediate types of vegetation in both space and time, in native bush. Factors involved include: ownership and protection status; protection of the site features, including stratigraphy, for archaeological interpretation and research; maintenance costs; weed and pest invasions; stock damage to features; and tourism/recreation. The opinions of tangata whenua, whether holding legal ownership or not, are important.

Because of their coastal or lowland location and the dominating influence of agriculture in this type of landscape, most sites are grass-covered and are grazed. Increasingly, these sites are becoming shrublands or are being planted (often unlawfully) in exotic forest. It is therefore important to observe sites that have been untouched since abandonment. Paparoa is an example of a coastal, kauri forest-covered **pā**, and Okuratope is an inland, mainly podocarp forest-covered **pā**, the vegetation on both being about 150-200 years old. The surface details of archaeological features have been well protected under native forest in these instances.

## **6.5 Grazing**

Grazing animals do very little for **pā** apart from making surface features visible. In the long term grazing causes soil erosion, tracking, weed invasion, compaction and the maintenance of unstable vegetation. The insidious, long-term loss of relief of surface features is a consequence of trampling.

## **6.6 Maintenance**

Mowing, weeding, planting, and other forms of vegetation management are difficult and costly in the long term and should be discouraged unless for specific site interpretative purposes. However, one-off improvements (like the boardwalk at **Pā Hill**) are good. This took pressure off and allowed re-growth in the former track base. Wherever possible, site management should be minimal and appropriate vegetation more or less self-maintaining. For this reason stable indigenous vegetation (grassland, fernland, and, when appropriate, forest) is seen in an increasingly positive light. The growth of tall native forest does not necessarily compromise a site:

- (1) Excellent protection of water and soil.
- (2) Stabilises earthwork features (e.g., rua maintained as cavities by roots).

- (3) Comprehensive range of values for conservation, including weed prevention.
- (4) Surface features are readily visible, especially with cleared undergrowth.

### **6.7 Interpretation**

Interpretation is seldom adequate, even at key historic places like Ruapekapeka, although Kororipo is an exception to this rule. Kororipo is also one of the few places where interpretative features to allow views, and to lower the weight of foot traffic have been installed. People can be inadvertent pests and cause erosion, weed invasion, littering and damage to facilities. Education on how people should conduct themselves on historic sites is important, especially with respect to Māori significance of the site, not doing anything to interfere with site stability or other peoples' appreciation of the place.

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**APPENDIX 1: Characteristics of native grasses suitable for site cover** (from Woods, 1993)

**Common name:** Meadow rice grass.

**Species name:** *Ehrharta stipoides*

**Photosynthetic pathway:** C<sub>3</sub>

**Seed harvesting:** Close seed crops during October. Harvest seed by hand from mid-December to early-February. Dry naturally and store under refrigerated conditions in paper or cloth bags. Threshing of seed is not necessary. Seed dormancy has not been noted.

**Establishment:** From seed or rhizomes. Seedlings are aggressive in cultivated soil. Seed is not commercially available. Sow 30 g/m<sup>2</sup> dehulled seed during autumn or spring when adequate soil moisture can be expected.

**Growth habit:** Erect bunched creeping grass with a very short and compact rhizome system producing numerous slender stems. Tends to form small patches or clumps.

**Fineness:** Moderately coarse texture but has reasonably narrow leaves. Stiff.

**Leaf colour:** Light green-yellow during the warmer seasons. Dark green during winter.

**Shade tolerance:** Good. Tolerates shading too severe for most lawn species. Also grows well in full sun.

**Productivity:** Low. Most growth occurs in the warmer summer months.

**Habitats:** Present in a very wide range of dry habitats including poorly managed pastures, summer dry country, orchards, parks, lawns, coastal areas and bush margins. Tolerant of poor fertility. Often present on dry hillsides.

**Origin:** Indigenous.

**Comments:** Forms a very attractive turf under close mowing. Tolerates mowing well. Close mowing can cause scalping. Best temperate species for summer greenness when mown. Yellow green in summer under lax management.

**Common name:** None

**Species name:** *Oplismenus imbecillus*

**Photosynthetic pathway:** C<sub>3</sub>

**Seed harvesting:** Generally a sparse seeder. Close seed crops during October, and harvest February by clipping inflorescences from plant. Dry naturally, store under refrigerated conditions in cloth or paper bags. Thresh or sort to remove trash.

**Establishment:** Establishes from seed or stolons. Seed is not commercially available. No information on seed sowing rates available.

**Growth habit:** Low growing grass with short broad leaves and trailing stems. Tends to form monocultures. Intolerant of heavy treading.

**Fineness:** Slightly coarse, but has fine small leaves under mowing.

**Leaf colour:** Dark green throughout the year. Some yellowing and browning in full sunlight and if frosted.

**Shade tolerance:** Excellent, more tolerant of shade than *Microlaena*. Intolerant of full sun.

**Productivity:** Low. Main growth occurs during spring and early summer.

**Habitats:** Commonly in shaded places. Never in full sun. Tolerates wide range of soil types. Intolerant of heavy frosting.

**Origin:** Indigenous.

**Potential use:** Excessively shaded areas under trees or beside buildings, suburban lawns and landscaped environments.

**Comments:** Under mowing in shaded conditions it forms a dense close mat.

Common name: Danthonia

Species name: *Rytidosperma biannulare*, *R. tenuius*, *R. pilosum*, *R. racemosum*, *R. pencilatum*, *R. gracile*, *R. unarede*.

Photosynthetic pathway: Not established, probably C<sub>3</sub>.

Seed: Not commercially available. Mature flower heads usually present during December and January.

Establishment: Seed. No other information available.

Growth habit: Short bunched grass. Tends to form individual clumps rather than a continuous sward.

Fineness: Extremely fine.

Leaf colour: Blue or grey green.

Shade tolerance: Poor, prefers open areas in full sunlight.

Productivity: Extremely low. Summer grower. Would only require very occasional mowing.

Habitats: Low fertility, dry habitats. Often on very steep sites with extremely low soil moisture.

Origin: Indigenous.

Cultivars: None. No known germplasm collections in New Zealand.

Potential use: Low maintenance amenity areas prone to excessive summer moisture stress.

Comments: *Rytidosperma biannulare* is one of the most common species of this genera in Northland. Very little information available. Has been reported as having an allelopathic effect on other species.

**APPENDIX 2****Scientific names of plants mentioned in text**

|                                   |  |
|-----------------------------------|--|
| akeake                            | <i>Dodonaea viscosa</i>  |
| astelias                          | <i>Astelia</i> spp., e.g. <i>A. trinervia</i>                  |
| barberry                          | <i>Berberis</i> spp., e.g. <i>B. darwinii</i>                  |
| blackberry                        | <i>Rubus</i> spp., <i>R. fruticosus</i> , <i>R. laciniatus</i> |
| black ponga (see mamaku)          | <i>Cyathea medullaris</i>                                      |
| boxthorn                          | <i>Lycium ferocissimum</i>                                     |
| bracken                           | <i>Pteridium esculentum</i>                                    |
| broom                             | <i>Cytisus scoparius</i>                                       |
| browntop                          | <i>Agrostis capillaris</i>                                     |
| buffalo grass                     | <i>Stenotaphrum secundatum</i>                                 |
| bush lawyer                       | <i>Rubus schmelidoides</i>                                     |
| cabbage tree                      | <i>Cordyline australis</i>                                     |
| California thistle                | <i>Cirsium arvense</i>   |
| clover, subterranean              | <i>Trifolium subterraneum</i>                                  |
| clover, white                     | <i>Trifolium repens</i>  |
| coastal five finger (see houpapa) | <i>Pseudopanax lessonii</i>                                    |
| cocksfoot                         | <i>Dactylis glomerata</i>                                      |
| convolvulus                       | <i>Calystegia turguriorum</i>                                  |
| convolvulus (native)              | <i>Calystegia arvensis</i>                                     |
| coprosma                          | <i>Coprosma</i> spp.   |
| couch grass                       | <i>Agropyron</i> spp.  |
| cow parsnip                       | <i>Heracleum</i> sp.   |
| crested dogstail                  | <i>Cynosurus cristatus</i>                                     |
| danthonia                         | <i>Rhytidosperra</i> spp.                                      |
| Douglas fir                       | <i>Pseudotsuga menziesii</i>                                   |
| elderberry                        | <i>Sambucus nigra</i>  |
| feverfew                          | <i>Pyrethrum parthenifolium</i>                                |
| five finger (see whauwhau)        | <i>Pseudopanax arboreus</i>                                    |
| flax                              | <i>Phormium tenax</i> , <i>P. cookianum</i>                    |
| foxglove                          | <i>Digitalis purpurea</i>                                      |
| fuchsia, tree                     | <i>Fuchsia excorticata</i>                                     |
| gooseberry                        | <i>Ribes</i> sp.   |
| gorse                             | <i>Ulex europaeus</i>  |
| Hall's totara (kotukutuku)        | <i>Podocarpus hallii</i>                                       |
| hangehange                        | <i>Geniostoma ligustrifolium</i>                               |
| hard tussock                      | <i>Festuca novae-zelandiae</i>                                 |
| hemlock                           | <i>Conium maculatum</i>  |
| horehound                         | <i>Marrubium vulgare</i>                                       |
| ice plant                         | <i>Mesembryanthemum</i> sp.                                    |
| inkweed                           | <i>Phytolacca octandra</i>                                     |
| ivy                               | <i>Hedera helix</i>  |
| kahikatea                         | <i>Dacrycarpus dacrydioides</i>                                |
| kaikōmako                         | <i>Pennantia corymbosa</i>                                     |
| kāmahi (tawhero)                  | <i>Weinmannia racemosa</i>                                     |
| kanono                            | <i>Coprosma grandifolia</i>                                    |

|                               |  |
|-------------------------------|--|
| kānuka                        | <i>Kunzea ericoides</i>                              |
| kawakawa                      | <i>Macropiper excelsum</i>                           |
| kikuyu grass                  | <i>Pennisetum clandestinum</i>                       |
| kohekohe                      | <i>Dysoxylum spectabile</i>                          |
| kohuhu                        | <i>Pittosporum tenuifolium</i>                       |
| koromiko                      | <i>Hebe salicifolia</i> and <i>H. stricta</i>        |
| kūmarahou                     | <i>Pomaderris kumeraho</i>                           |
| lancewood                     | <i>Pseudopanax crassifolium</i>                      |
| Lombardy poplar               | <i>Populus nigra</i> var. <i>italica</i>             |
| lotus                         | <i>Lotus pedunculatus</i>                            |
| lucerne                       | <i>Medicago sativa</i>                               |
| lupin                         | <i>Lupinus arboreus</i>                              |
| macrocarpa                    | <i>Cupressus macrocarpa</i>                          |
| māhoe (whiteywood)            | <i>Melicactus ramiflorus</i>                         |
| māhoe-wao                     | <i>Melicactus lanceolatus</i>                        |
| mamaku                        | <i>Cyathea medullaris</i>                            |
| mangeao                       | <i>Litsea calicaris</i>                              |
| mānuka                        | <i>Leptospermum scoparium</i>                        |
| marram grass                  | <i>Ammophila arenaria</i>                            |
| māpau                         | <i>Myrsine australis</i>                             |
| matagouri                     | <i>Discaria toumatou</i>                             |
| matai                         | <i>Prumnopitys taxifolia</i>                         |
| mingimingi                    | <i>Leucopogon fasciculatus</i>                       |
| New Zealand Iris              | <i>Libertia ixioides</i>                             |
| ngaio                         | <i>Myoporum laetum</i>                               |
| nīkau                         | <i>Rhopalostylis sapida</i>                          |
| pampas grass                  | <i>Cortaderia selloana</i>                           |
| pātītī (meadow rice grass)    | <i>Ehrharta stipoides</i>                            |
| pepper tree                   | <i>Pseudowintera colorata</i>                        |
| periwinkle                    | <i>Vinca major</i>                                   |
| piripiri                      | <i>Acaena</i> sp.                                    |
| podocarp                      | <i>Podocarpaceae</i>                                 |
| pōhutukawa                    | <i>Metrosideros excelsa</i>                          |
| ponga                         | <i>Cyathea dealbata</i>                              |
| poroporo                      | <i>Solanum aviculare</i> , <i>S. laciniatum</i>      |
| pūriri                        | <i>Vitex lucens</i>                                  |
| putaputawētā (see marbleleaf) | <i>Carpodetus serratus</i>                           |
| rātā                          | <i>Metrosideros robusta</i> , <i>M. umbellata</i>    |
| rangiora                      | <i>Brachyglottis repanda</i>                         |
| rewarewa                      | <i>Knightia excelsa</i>                              |
| rimu                          | <i>Dacrydium cupressinum</i>                         |
| ryegrass                      | <i>Lolium perenne</i>                                |
| silver tussock                | <i>Poa caespitosa</i>                                |
| Spanish heath                 | <i>Erica lusitanica</i>                              |
| speargrass                    | <i>Aciphylla</i> spp.                                |
| spinach, native               | <i>Tetragonia tetragonioides</i> , <i>T. trigyna</i> |
| spinifex                      | <i>Spinifex hirsutus</i>                             |

|                     |   |
|---------------------|---|
| St John's wort      | <i>Hypericum</i> sp.  |
| sweet briar         | <i>Rosa rubiginosa</i>  |
| tarata (lemonwood)  | <i>Pittosporum eugenioides</i>  |
| Tasmanian blackwood | <i>Acacia melanoxylon</i>   |
| tauhinu             | <i>Cassinia leptophylla</i>   |
| tawa                | <i>Beilschmiedia tawa</i>   |
| tawapou             | <i>Planchonella novae-zelandiae</i>                                     |
| thyme               | <i>Thymus vulgaris</i>  |
| tī                  | <i>Cordyline</i> spp.   |
| tītoki              | <i>Alectryon excelsum</i>   |
| toetoe              | <i>Cortaderia</i> spp.  |
| tōtara              | <i>Podocarpus totara</i> , <i>P. hallii</i>                             |
| tree fern           | <i>Dichsonia</i> , <i>Cyathea</i> spp.                                  |
| tree tobacco        | <i>Nicotiana glauca</i>   |
| tutu                | <i>Coriaria arborea</i>   |
| vervain             | <i>verbena</i> sp.  |
| viper's bugloss     | <i>Echium vulgare</i>   |
| wattle, brush       | <i>Paraserianthes lapantha</i> (formerly <i>Albizzia pseudoacacia</i> ) |
| whārangī            | <i>Melicope ternata</i>   |
| wild mignonette     | <i>Reseda luteola</i>   |
| wild teasel         | <i>Dipsacus sylvestris</i>  |
| woolly mullein      | <i>Verbascum thapsus</i>  |
| willow              | <i>Salix</i> spp.   |
| wineberry           | <i>Aristotelia serrata</i>  |
| yorkshire fog       | <i>Holcus lanatus</i>   |
| yarrow              | <i>Achillea millefolium</i>   |

## APPENDIX 3 GLOSSARY

Some terms are included for an international readership.

*Alluvial.* Soils derived from river action or silt deposition.

*Amenity.* Used for recreation or uses other than conservation.

*Archaic.* The earliest period of Polynesian settlement in New Zealand, from about A.D. 1050 to A.D. 1450.

*Bastion.* A projecting part of a defensive perimeter, usually a feature of fortifications with straight perimeter lengths greater than about 50 metres.

*Batter.* Steep cut on upper edge of benched roadway.

*Breastwork.* A bank created for fortification, usually forward of a trench, against which a defender lay or kneeled to fire.

*Classic.* The later period in pre-European times. Period: approximately A.D. 1500 to 1800 (or 350-150 years B.P). The cultural practices described by Cook and Banks in 1769 are essentially Classic.

*Climax, climax vegetation.* The vegetation that is thought to provide the final long term cover after successional processes have ceased.

*Colluvial.* Soils formed at the foot of a slope by erosion from above.

*D. b. h.* Diameter at breast height (an objective measure of size of tree).

*Embrasure.* Opening in breastwork defence for canon.

*Gallery forest.* A forest either naturally or deliberately clear of shrubs.

*Inner, outer.* With reference to defences, the inner side is the side nearest the defenders.

*Iwi.* Iwi **Māori**; tribal groups entitled to be consulted about land management.

*Lateral ditch and bank.* A defensive ditch and bank constructed on the sides of a ridge as part of the defensive perimeter of a **pā**; such features are often simply a long lateral scarp and narrow terrace.

*Loess.* Glacial dust blown on to land forms forming a fine sandy clay rather prone to slumping and tunnel erosion.

*Lynchets.* Small terraces or terrace treads. Sheep lynchets: more or less parallel and level, narrow terraces created by sheep tracking.

*Microsite.* Small area where a specific ecological process relevant to site stabilisation but different to that of the wider landscape may occur.

*Midden.* Food refuse such as bone, shells, and oven debris.

*Mullock heap.* Rock and gravel debris from a mine shaft

*Oblique photograph, aerial oblique.* A view from an angle less than directly vertical.

*Outer, inner.* See *inner, outer*.

*Pā, pā maioro.* Earthwork fortification. The defences may be natural, steep slopes, deliberately steepened scarps, or ditches and banks.

*Palisade.* Defensive fence of tall posts constructed at the perimeter of **pā**, with lighter timbers between tall posts. See also *stockade*.

*Parallel, demi parallel.* A trench constructed at right angles to the line of a sap, to enable a fuller field of fire against the defenders, or to take outlying positions which threaten the sap.

*Perimeter, defended perimeter.* The outer defensive line of a **pā** or other fortification.



*Photosynthetic pathway.* The mechanism of photosynthesis in grasses that depend on the species' adaptation to drought, temperature, light and atmospheric composition. C<sub>3</sub> is the norm; C<sub>4</sub> is unusual in temperate conditions.

*Plan, plan view.* The view of an archaeological site seen or drawn from directly above; the view in the horizontal plane.

*Platform.* Open level spaces standing at top of slope, usually in a pā. Tihi: the highest, most prominent platform.

*Proximal.* The end of a spit that is connected to the mainland; opposite of *distal*.

*Queens Chain.* Strip of land 20 m wide set aside by river courses for access, soil conservation, etc.

*Queenite.* Māori supporter of the government, or Queen Victoria.

*Raised-rim pit.* A semi-subterranean pit, rectangular in plan, with a raised rim and often a perimeter drain. In use, the pit had a roof, perhaps of earth, with a central ridge pole and support.

*Redoubt.* A European fortification, typically square or rectangular in plan, with a perimeter ditch and bank.

*Returns.* Changes in direction of rifle trench to stop fire along its length.

*Rifle trench.* Trench for protecting defenders and to fire rifle from; may have *returns*.

*Ring-ditch, ring-ditch pā.* A defensive ditch enclosing most of a site in a more or less continuous line; the defensive perimeter typically includes a cliff face, but in Taranaki, for example, on lahar mounds, the perimeter may be fully constructed.

*Rua.* Kūmara storage pit; in archaeologist's sense, a fully subterranean pit, usually bell-shaped in section with a narrow opening at the ground surface.

*Sap.* A trench dug to bring attacking troops up to a defended position.

*Scarp.* The artificially steepened slope forming the downhill or uphill slope of a terrace or a ditch and bank. See also counter-scarp.

*Section.* The view of a vertical cut through an archaeological site; the view in the vertical plane. See also *plan*.

*Standing structure.* Any building or engineering feature, ruined or not, that is more appropriately managed by architectural conservation means; as opposed to archaeological site.

*Stockade.* A defensive perimeter made of solid upright timbers and with loopholes for firing through; may also be constructed with an exterior ditch.

*Stratigraphy.* The layers of an archaeological site. Vertical stratigraphy shows the sequence in which the site was laid down; horizontal stratigraphy shows the pattern of activities on a surface, for example, a house floor.

*Tangata whenua.* See iwi.

*Terrace-risers.* The uphill or downhill scarp of a terrace.

*Terrace-tread.* The flat part of a terrace.

*Tihi.* See *platform*.

*Transverse ditch and bank.* A defensive ditch and bank constructed across a ridgeline.

*Treeland.* Open grassed landscape with specimen or clumped trees, fairly open underneath.

*Tunnel erosion.* Seepage of water into planes of weakness in clay or sand cover, leading to erosion in underground cavities; marked by dramatic failure of surface.

*Tuff-ring.* Steep edge of tuff (ejected rock and ash) at the rim of a volcanic vent.

*Wāhi tapu.* Sacred site.

*Whare.* House.