

SEAWEED UTILIZATION

(a) *Agar*.—Surveys during 1943 showed extensive reserves of agar seaweed between Cape Turnagain and Castlepoint, as yet little collected. *Pterocladia lucida* is in fair quantity at Kaikoura, and in Taranaki useful amounts, especially of the smaller *P. capillacea*, can be obtained. The total weed collected in 1943 was over 70 tons, about half coming from the Bay of Plenty, a quarter from Hokianga (a new district), and the remainder from the East Cape, Southern Hawke's Bay, and Coromandel areas. At least two hundred families are involved in collecting agar seaweed as a profitable side-line. Manufacture of agar began in July, 1943, and the product is being used for culture media and for meat-canning. For both purposes the agar is quite satisfactory, being characterized by good colour, high gel strength, low ash content, and rather high melting-point. It has been favourably reported on by manufacturers of condensed milk, cosmetics, and pharmaceutical preparations. The product is standardized for sale, but there are irregularities in the weed, and the botanical basis of these differences is being investigated. Spore-production has been found to be continuous throughout the year, so that there appears to be no objection to harvesting at whatever season fits best in the local routine. A smaller weed, *Gelidium coulacanthum*, submitted for test yields a satisfactory agar. Local supplies of *Gracilaria* are being explored, as this weed, though more difficult to deal with than *Pterocladia*, yields a low-melting-point agar that is needed for certain shake cultures. Contact is being maintained with agar-workers in other countries, where, except in California, more difficulties seem to be encountered than in the local project.

(b) *Carrageen*.—New Zealand requirements for industry are being met satisfactorily from local sources, but inquiries about domestic and culinary use are still numerous. Known sources could supply many times the present demand.

WEED INVESTIGATIONS

General.—Survey work during the year has given special attention to weeds of tobacco and linen-flax crops, and to tussock-grassland and forest-pasture weeds. Cape tulip (*Homeria collina*), native to South Africa, is recorded for the first time in New Zealand. This plant causes serious stock-poisoning in parts of Australia, and has come under suspicion in the area in which it occurs in this country. Some 4 acres are known to be infested in Marlborough with odd plants on the adjacent hillsides to a distance of over two miles. The presence of a variety of salt-root (*Salsola kali*) was noted in 1920 in Central Otago by the late Dr. Cockayne, but was not recorded. While so far not proving aggressive, this weed should be watched carefully in view of experiences in Canada and the United States. The coastal variety, recorded as early as 1854, gives no trouble.

Nassella Tussock.—A survey has been made of an hitherto unrecorded infestation in the Black Hills-Medbury-Kaiwarra River area in North Canterbury. From 150 acres to 200 acres are heavily infested, some 2,000 acres have a medium infestation, and roughly 22,000 acres have scattered plants. An area is being studied in Marlborough where the tussocks appear to be dying off. Definite evidence was obtained of seeds being carried by wind and deposited some six miles from the nearest source of infestation. Trial plots have been laid down to ascertain the effects of (1) firing at different intervals; (2) value of different weed-killers.

POISONOUS PLANTS

Material of the following species has been supplied to the Animal Research Station, Wallaceville, where feeding tests are being conducted: Pigeonwood (*Hedycarea arborea*), akakiore (*Parsonsia* spp.), tawa (*Beilschmiedia tawa*), mahoe (*Melicytus ramiflorus*), titoki (*Alectryon excelsum*), five-finger (*Nothopanax arboreum*), monkey-musk (*Mimulus guttatus*), rangiora (*Brachyglottis repanda*), and kohuhu (*Pittosporum tenuifolium*). Pigeonwood and tawa proved definitely toxic to rats, while kohuhu and akakiore remain doubtful.

MEDICINAL PLANTS

(a) *Atropa belladonna*.—Plants raised in cold frames, hardened off, and transplanted in spring or early autumn establish successfully; direct sowing gives, in general, unsatisfactory results. Dull or wet weather depresses the alkaloid content, hot sunny days being best for harvesting. Upper leaves are highest in alkaloid content (0.39 per cent.) as plants complete flowering; the large lower leaves are low in alkaloid content except when the plant is mature (content then rising to 0.20 per cent.). Liquid manure decreased yield of leaf significantly, but the assay was higher (0.60 per cent.; control, 0.43 per cent.). Sulphate of ammonia increased yield but lowered assay (0.34 per cent.). Nitrate of soda and blood and bone gave no significant results. Selection work suggests that high alkaloid content may not be inherited. Individual plants showed a range of 0.1 per cent. to 1.0 per cent. total alkaloids; the general harvest figures are 0.25 to 0.4 for leaf, and 0.33 to 0.4 for root.

(b) *Digitalis*.—*D. purpurea* experiments showed that temperatures of 210° F. cause a significant reduction in glucoside content. High-temperature drying, up to 180° F., is now recommended overseas. *D. lanata*: Rosette leaves yielded 0.5 per cent. to 1.0 per cent. total glucosides. Yields have exceeded 1 ton of dry leaf per acre, and it appears likely that this species will replace *D. purpurea* owing to the easier estimation and the higher glucoside content.

(c) *Datura stramonium*.—Seed drilled in late spring, plants thinned to 3 ft. apart each way, gives satisfactory results. Analyses indicate that alkaloid content is highest as the last flowers are opening. Five acres at Hastings failed to set a single capsule, the leaf assay being very high (0.60 per cent.; B.P. 0.25). Selection work indicates same position as obtained for belladonna. Heavy applications of liquid manure reduced alkaloid content (0.39 per cent.; control, 0.50). Blood and bone and sulphate of ammonia gave no significant differences. Drying at 200° F. did not significantly reduce alkaloid content as against drying at 140° F. (0.42 per cent.: 0.45 per cent.). The yield of dry leaf of the "Wellington" type is about 1,500 lb. per acre. Large lower leaves of mature plants tested 0.27 per cent., the flowering tops 0.45 per cent.