Collection and Evaluation of Unused Genetic Resources as Related to Crops in Malaysia and Indonesia

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Introduction

From October to December in 1974, the authors were sent to Malaysia and Indonesia under the project, nominated "Survey on Unused Plants in Southeast Asia", and supported by a Grant from the Ministry of Education, Japan.

In the Southeast Asia, there are many kinds of crops which have been originated, and furthermore cultivated in and from the ancient times. Then, it has been suggested that there are many plants, the genetic characters of which have remained unascertained and which have been left unused, until now, for the cultivation as well as for the breeding. There have been mainly nomenclatural and monographic reports[2,3,6,7,9,10,12,13,17,19~25,27~30]. However, attention to these natural resources has been given by only a few agriculturists.

In recent years, natural habitats have been greatly disturbed by many kinds of development-projects and, accordingly, these genetic resources are considered to be at the point of being ruined or exterminated. From the view point of human life, it has been stressed that these useful genetic resources should be protected from the danger at the native places as early as it is possible. And the work on the investigation and collection of various kinds of wild and cultivated plants in tropical Asia, which is to be carried out with the purpose of preserving and evaluating the unused genetic germ plasm, has been keenly needed. The present project was designed and performed for putting the latter work into practice.

The collections are made of two sets of specimens. One of them has been preserved at The Ibusuki Experimental Botanic Garden, Faculty of Agriculture, Kagoshima University and, another, at The National Biological Institute, Indonesia, or The University of Malaya, Malaysia.

In this report, the list of specimens collected, and the record of some morphological characters of those and others, have been described.

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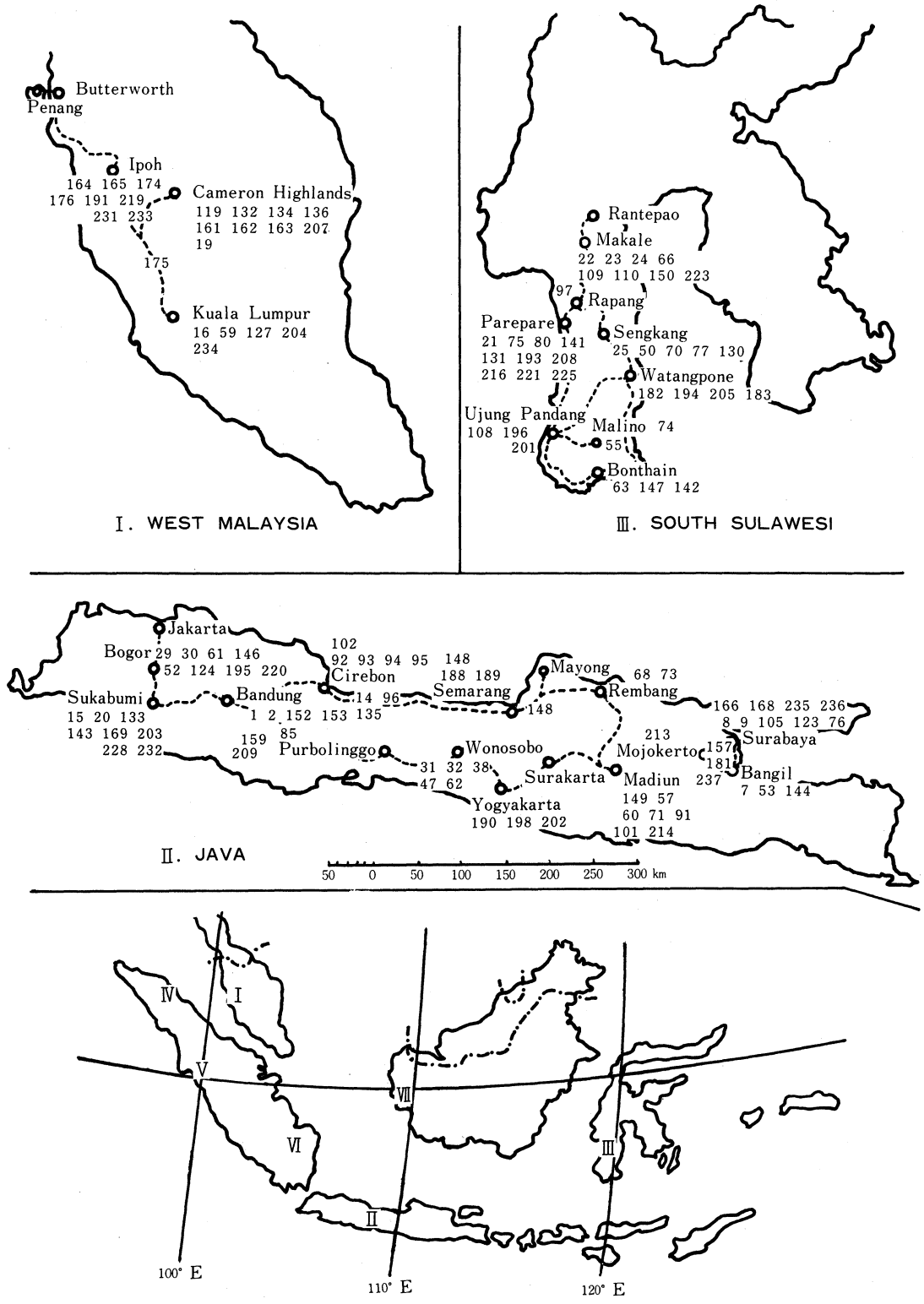

Fig. 1. Maps showing the observation routes and collecting sites and plants with code No. in West Malaysia, Java and South Sulawesi. Dotted line: routes of observation; open circle: main town. Code numbers in this figure are corresponding to the strain No. in Table 1.

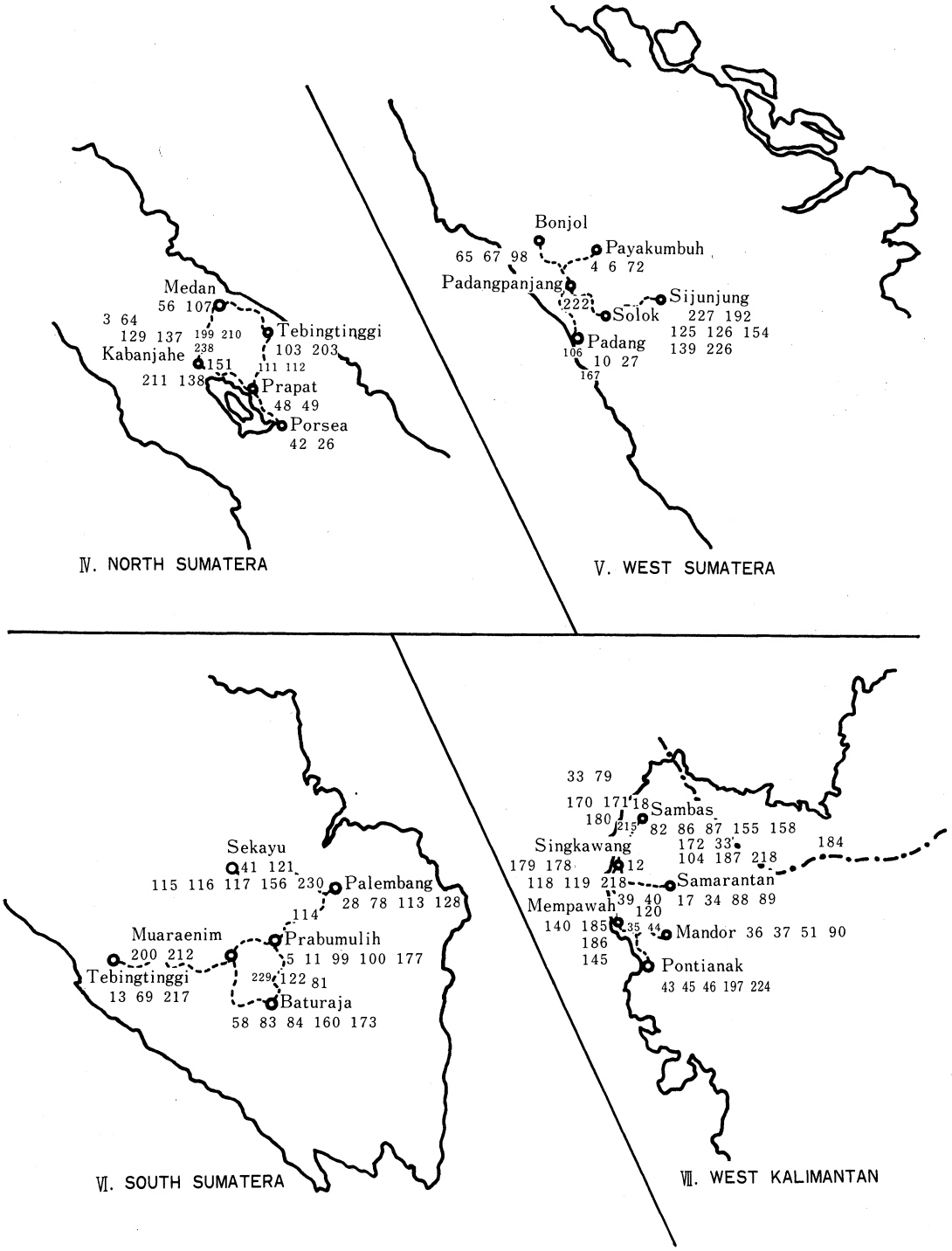

Fig. 2. Maps showing the observation routes and collecting sites and plants with code No. in North Sumatera, West Sumatera, South Sumatera and West Kalimantan. Dotted line: routes of observation; open circle: main town. Code numbers in this figure are corresponding to the strain No. in Table 1.

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Collections and their Morphological Characters

Collection was carried out at the following districts; West Malaysia, in Malaysia, East Java, West Java, Central Java, South Sulawesi, North Sumatera, West Sumatera, South Sumatera and West Kalimantan, in Indonesia.

The materials collected were identified to be 238 strains, 110 genera and 42 families. The species names with family, their collected materials, the collection date, place and habitat are listed up in Table 1, and some morphological characters of fruits and seeds collected are described in Table 2. Furthermore, geographical distributions of collections were briefly illustrated in Figs. 1 and 2. In these figures, the observation routes and collecting sites and plants with code No. are given.

Table 1. A list of the collected plants in Indonesia and Malaysia.

Code No.	Family	Species	Collection date	Collected materials	Place	Habitat
1	*Acanthaceae*	*Megakepasma erythrochlamys* Laudau	Dec. 9.	Seed.	Bandung, West Java.	Waste land
2	*Amaranthaceae*	*Amaranthus mangostanus* L.	Dec. 9.	Seed.	Bandung, West Java.	Road side
3	*Amaryllidaceae*	*Crinum asiaticum* L.	Nov. 13.	Seed, Bulb.	Sibolangit, North Sumatera.	Jungle
4		*C. asiaticum* L.	Nov. 19.	Seed.	Batusangkar, West Sumatera.	Forest
5		*Curculigo latifolia* Dry.	Nov. 26.	Seed.	Prabumulih, South Sumatera.	Road side on the hill
6	*Anacardiaceae*	*Mangifera foetida* Lour.	Nov. 26.	Fruit, Seed.	Payakumbuh, West Sumatera.	Road side near a human habitation
7		*M. indica* L.	Oct. 26.	Fruit, Seed.	Gempol, East Java.	Market
8		*M. indica* L.	Oct. 26.	Fruit, Seed.	Surabaya, East Java.	Market
9		*M. indica* L.	Oct. 26.	Fruit, Seed.	Surabaya, East Java.	Market

10	*Anacardiaceae*	*M. odorata* Griff.	Nov. 18. Fruit, Seed. Sicincin, West Sumatera. Forest near a human habitation
11		*M. odorata* Griff.	Nov. 27. Fruit, Seed. Prabumulih, South Sumatera. Forest
12	*Annonaceae*	*Annona muricata* L.	Dec. 16. Fruit, Seed. Singkawang, West Kalimantan. Market
13		*Stelechocarpus burakol* (Bl.) HK. & Thoms	Nov. 29. Seed. Lahat, South Sumatera. Forest
14	*Apocynaceae*	*Carissa carandas* L.	Dec. 9. Fruit, Seed. Cirebon, West Java. Home garden
15		*Rauvolfia perticilata*	Oct. 18. Seed. Sukabumi, West Java. Waste land near a human habitation
16	*Araceae*	*Alocasia macrorrhiza* (L.) Schott.	Oct. 9. Tuber. Kuala Lumpur, Malaysia. Grassland on the hill
17		*Caladium bicolor* Vent.	Dec. 17. Tuber. Samalantan, West Kalimantan. Waste land in forest
18		*C. picturatum* C. Koch et Buch	Dec. 15. Tuber. Sambas, West Kalimantan. Waste land
19		*Colocasia antiquorum* Schott. var. *esculenta* Engl.	Oct. 10. Tuber. Cameron Highlands, Malaysia. Road side field
20		*C. a.* var. *esculenta* Engl.	Oct. 18. Tuber. Sukabumi, West Java. Marsh land near field
21		*C. a.* var. *esculenta* Engl.	Oct. 31. Tuber. Parepare, South Sulawesi. Pondside
22		*C. a.* var. *esculenta* Engl.	Nov. 1. Tuber. Makale, South Sulawesi. Riverside, adjacent to human habitation
23		*C. a.* var. *esculenta* Engl.	Nov. 1. Tuber. Makale, South Sulawesi. Riverside, adjacent to human habitation
24		*C. a.* var. *esculenta* Engl.	Nov. 1. Tuber. Makale, South Sulawesi. Road side ditch
25		*C. a.* var. *esculenta* Engl.	Nov. 4. Tuber. Sengkang, South Sulawesi. Pondside
26		*C. a.* var. *esculenta* Engl.	Nov. 14. Tuber. Porsea, North Sumatera. Road side near field
27		*C. a.* var. *esculenta* Engl.	Nov. 18. Tuber. Padang, West Sumatera. Waste land near a human habitation
28		*C. a.* var. *esculenta* Engl.	Nov. 24. Tuber. Palembang, South Sumatera. Riverside on the way to Betung
29		*C. a.* var. *esculenta* Engl.	Dec. 10. Tuber. Bogor, West Java. Road side market
30		*C. a.* var. *esculenta* Engl.	Dec. 10. Tuber. Bogor, West Java. Road side market
31		*C. a.* var. *esculenta* Engl.	Dec. 5. Tuber. Purwokerto, Central Java. Road side swamp
32		*C. a.* var. *esculenta* Engl.	Dec. 5. Tuber. Purwokerto, Central Java. Riverside marsh land
33		*C. a.* var. *esculenta* Engl.	Dec. 16. Tuber. Sambas, West Kalimantan. Waste land near a human habitation
34		*C. a.* var. *esculenta* Engl.	Dec. 17. Tuber. Samalantan, West Kalimantan. Road side marsh land
35		*C. a.* var. *esculenta* Engl.	Dec. 17. Tuber. Nyarungkup, West Kalimantan. Road side marsh land

36	*Araceae*	*C. a.* var. *esculenta* Engl.	Dec. 17. Tuber. Mandor, West Kalimantan. Field near a human habitation
37		*C. a.* var. *esculenta* Engl.	Dec. 17. Tuber. Mandor, West Kalimantan. Home garden
38		*C. a.* var. *globulifera* Engl.	Dec. 5. Tuber. Purwokerto, Central Java. Riverside, shaded by tree
39		*C. a.* var. *globulifera* Engl.	Dec. 17. Tuber. Sintang Raya, West Kalimantan. Waste land near the field
40		*C. a.* var. *globulifera* Engl.	Dec. 17. Tuber. Sintang Raya, West Kalimantan. Road side near a human habitation
41		*C. a.* var. *globulifera* Engl.	Nov. 25. Tuber. Sekayu, South Sumatera. Riverside near a human habitation
42		*C. a.* var. *globulifera* Engl.	Nov. 14. Tuber. Porsea, North Sumatera. Market
43		*C.* sp.	Dec. 18. Tuber. Pontianak, West Kalimantan. Market
44		*C.* sp.	Dec. 17. Tuber. Nyarungkup, West Kalimantan. Road side marsh land
45		*C.* sp.	Dec. 18. Tuber. Pontianak, West Kalimantan. Market
46		*C.* sp.	Dec. 18. Tuber. Pontianak, West Kalimantan. Market
47		*C.* sp.	Dec. 5. Tuber. Purwokerto, Central Java. Riverside near paddy field
48		*Xanthosoma sagittifolium* Schott.	Nov. 14. Tuber. Prapat, North Sumatera. Home garden
49		*X. sagittifolium* Schott.	Nov. 14. Tuber. Prapat, North Sumatera. Road side
50		*X. sagittifolium* Schott.	Nov. 4. Tuber. Sengkang, South Sulawesi. Riverside in a village
51		*X. sagittifolium* Schott.	Dec. 18. Tuber. Mandor, West Kalimantan. Field
52		*Amorphophallus bulbifer* Bl.	Oct. 9. Seed. Mangis, West Java. Road side bush
53		*A. bulbifer* Bl.	Oct. 26. Seed. Gempol, East Java. Waste land near forest
54		*A. bulbifer* Bl.	Oct. 31. Tuber. Barru, South Sulawesi. Valley in forest
55		*A. bulbifer* Bl.	Nov. 6. Seed. Malino, South Sulawesi. Forest
56		*A. oncophyllus* Prain ex Hook. f.	Nov. 13. Tuber. Medan, North Sumatera. Waste land near a human habitation
57		*A. oncophyllus* Prain ex Hook. f.	Oct. 7. Seed. Madiun, East Java. Home garden
58		*A. rex* Hook. f.	Nov. 29. Tuber. Baturaja, South Sumatera. Waste land near field
59		*A. rex* Hook. f.	Oct. 10. Seed. Kuala Lumpur, Malaysia. Marsh land near road side
60		*A. variabilis* Bl.	Dec. 7. Seed. Madiun, East Java. Forest
61		*Zamioculcas zamiifolia* Engl.	Dec. 10. Clone. Bogor, West Java. Home garden
62	*Araliaceae*	*Polyscias filicifolia* L. H. Bailey	Dec. 7. Stem. Margomulyo, Central Java. Road side near a human habitation

63	*Asclepiadaceae*	*Calotropis gigantea* Ait.	Nov. 5. Seed. Bulkumba, South Sulawesi. Seaside with sandy soil
64	*Basellaceae*	*Basella rubra* L. var. *alba* L.	Nov. 13. Seed. Sibolangit, North Sumatera. Fence of home garden
65		*B. a.* var. *alba* L.	Nov. 18. Seed. Bukittinggi, West Sumatera. Road side near a human habitation
66	*Compositae*	*Helianthus tuberosus* L.	Nov. 1. Seed. Makale, South Sulawesi. Waste land near a field
67		*Tithonia diversifolia* (Hemsl.) A. Gray	Nov. 18. Seed. Bukittinggi, West Sumatera. Road side bushland
68	*Convolvulaceae*	*Ipomoea carnea* Jacq.	Oct. 26. Seed. Mojokerto, East Java. Road side waste land
69		*I. reptans* Poir.	Nov. 29. Seed. Lahat, South Sumatera. Riverside
70		*I. reptans* Poir.	Nov. 4. Seed. Sengkang, South Sulawesi. Side of Tempe Lake
71	*Cucurbitaceae*	*Lagenaria leucantha* Rusby	Dec. 7. Seed. Madiun, East Java. Waste land near a field
72		*Luffa acutangula* Roxb.	Nov. 19. Seed. Payakumbuh, West Sumatera. Home garden
73		*L. cylindrica* Roem.	Oct. 26. Seed. Mojokerto, East Java. Tree near a human habitation
74		*L.* sp.	Nov. 4. Seed. Tanete, South Sulawesi. Road side waste land near field
75		*Momordica charantia* L.	Nov. 1. Seed. Parepare, South Sulawesi. Road side on the hill
76		*M. charantia* L.	Nov. 26. Seed. Surabaya, East Java. Market
77		*M. charantia* L.	Nov. 4. Seed. Sengkang, South Sulawesi. Waste land near a field
78		*M. charantia* L.	Nov. 24. Seed. Palembang, South Sumatera. Road side in forest
79		*M. charantia* L.	Nov. 16. Seed. Tebas, West Kalimantan. Road side market
80	*Dioscoreaceae*	*Dioscorea alata* L.	Oct. 31. Aerial bulblet. Parepare, South Sulawesi. Grove near field
81		*D. alata* L.	Nov. 29. Aerial bulblet. Beringin, South Sumatera. Grove near a human habitation
82		*D. alata* L.	Dec. 15. Bulb. Sambas, West Kalimantan. Waste land near field
83		*D. alata* L.	Nov. 29. Bulb. Baturaja, South Sumatera. Home garden
84		*D. alata* L.	Nov. 29. Aerial bulblet. Baturaja, South Sumatera. Road side waste land
85		*D. alata* L.	Dec. 5. Bulb. Bandung, West Java. Market
86		*D. alata* L.	Dec. 15. Aerial bulblet. Sambas, West Kalimantan. Open waste land near field
87		*D. alata* L.	Dec. 15. Aerial bulblet. Sambas, West Kalimantan. Home garden
88		*D. alata* L.	Dec. 17. Aerial bulblet. Samalantan, West Kalimantan. Grove near field
89		*D. alata* L.	Dec. 17. Aerial bulblet. Samalantan, West Kalimantan. Grove near field

90		*D. alata* L.	Dec. 18. Aerial bulblet. Mandor, West Kalimantan. Forest near a human habitation
91		*D. alata* L.	Dec. 7. Bulb. Madiun, East Java. Waste land near field
92		*D. alata* L.	Dec. 8. Bulb. Teresono, Central Java. Forest
93		*D. alata* L.	Dec. 8. Aerial bulblet. Tegal, Central Java. Waste land near home garden
94		*D. alata* L.	Dec. 8. Bulb. Brebes, Central Java. Field
95		*D. alata* L.	Dec. 8. Bulb. Teresono, Central Java. Forest
96		*D. alata* L.	Dec. 9. Aerial bulblet. Cirebon, West Java. Market
97		*D. bulbifera* L.	Nov. 1. Aerial bulblet. Rappang, South Sulawesi. Grassland
98		*D. esculenta* Burk.	Nov. 18. Bulb. Bukittinggi, West Sumatera. Riverside bush near paddy field
99		*D. esculenta* Burk.	Nov. 29. Aerial bulblet. Prabumulih, South Sumatera. Home garden
100		*D. pentaphylla* L.	Nov. 29. Aerial bulblet. Prabumulih, South Sumatera. Bush near a human habitation in village
101		*D. pentaphylla* L.	Dec. 7. Aerial bulblet. Madiun, East Java. Waste land near field
102		*D. pentaphylla* L.	Dec. 8. Aerial bulblet. Teresono, Central Java. Forest
103	*Euphorbiaceae*	*Aleurites moluccana* (L.) Wild.	Nov. 15. Seed. Tebingtinggi, North Sumatera. Bushland near forest
104		*Baccaurea sapida* Muell-Arg.	Dec. 15. Fruit, Seed. Singkawang, West Kalimantan. Road side in village
105		*Phyllanthus* sp.	Dec. 26. Seed. Surabaya, East Java. Forest
106	*Flacourtiaceae*	*Flacourtia rukan* Zoll. et Moir.	Nov. 17. Fruit, Seed. Telukbayar, West Sumatera. Road side in village
107	*Gnetaceae*	*Gnetum gnemon* L.	Nov. 13. Seed. Medan, North Sumatera. Forest
108	*Gramineae*	*Bambusa* sp.	Nov. 6. Rhizome. Ujung Pandang, South Sulawesi. Forest
109		*B.* sp.	Nov. 2. Rhizome. Makale, South Sulawesi. Jungle
110		*B.* sp.	Nov. 2. Rhizome. Makale, South Sulawesi. Jungle
111		*Oryza officinalis* Wall.	Nov. 14. Seed, Plant. Payah Nibung, North Sumatera. Ditch between rubber tree plantation and paddy field
112		*O. officinalis* Wall.	Nov. 14. Seed, Plant. Payah Nibung, North Sumatera. Road side ditch
113		*O. officinalis* Wall.	Nov. 24. Seed, Plant. Lokong Terusan, North Sumatera. Wet waste land near river
114		*O. officinalis* Wall.	Nov. 24. Seed, Plant. Kertapati, South Sumatera. Road side open tank

115		*O. officinalis* Wall.	Nov. 25. Seed, Plant. Betung, South Sumatera. Small river side, shaded by trees
116		*O. officinalis* Wall.	Nov. 26. Seed, Plant. Betung, South Sumatera. River side, flooding in rainy season
117		*O. officinalis* Wall.	Nov. 26. Seed, Plant. Betung, South Sumatera. Road side ditch
118		*O. officinalis* Wall.	Dec. 16. Seed, Plant. Sungai Tanjung, West Kalimantan. Road side ditch
119		*O. officinalis* Wall.	Dec. 16. Seed, Plant. Sungai Duri, West Kalimantan. Road side open tank
120		*O. officinalis* Wall.	Dec. 16. Seed, Plant. Sungai Duri, West Kalimantan. Road side ditch
121		*O. ridleyi* Hook.	Nov. 25. Seed, Plant. Sekayu, South Sumatera. Road side swampy and groomy forest
122		*O. ridleyi* Hook.	Nov. 29. Seed, Plant. Prabumulih, South Sumatera. Forest, same habitat as above
123	*Guttiferae*	*Garcinia mangostana* L.	Oct. 26. Fruit, Seed. Surabaya, East Java. Home garden
124	*Labiatae*	*Ocimum basilicum* L. f. *citratum* Back.	Dec. 4. Seed. Bogor, West Java. Home garden
125		*Orthosiphon spiralis* Merr.	Nov. 21. Seed. Cupak, West Sumatera. Waste land near a human habitation
126		*Perilla frutescens* (L.) Britt. var. *crispa* Decsn	Nov. 21. Seed. Cupak, West Sumatera. Waste land near field
127	*Lauraceae*	*Cinnamomum* sp.	Oct. 13. Seed. Kuala Lumpur, Malaysia. Road side near MARDI
128	*Leguminosae*	*Acasia auriculaeformis* A. Cunn. ex Benth.	Nov. 29. Seed. Palembang, South Sumatera. Road side on the way to airport
129		*Arachis hypogeana* L.	Nov. 13. Seed. Berastagi, North Sumatera. Waste land near field
130		*Canavalia* sp.	Nov. 3. Seed. Sengkang, South Sulawesi. Jungle
131		*Cassia tomentosa* L. f.	Oct. 31. Seed. Parepare, South Sulawesi. Waste low land
132		*C.* sp.	Oct. 8. Seed. Cameron Highlands, Malaysia. Grassland in valley
133		*Caesalpinia pulcherrima* (L.) Sw.	Oct. 18. Seed. Sukabumi, West Java. Road side waste land
134		*Crotalaria anagyroides* H. B. & K.	Oct. 10. Seed. Cameron Highlands, Malaysia. Grassland in valley
135		*C. retusa* L.	Dec. 8. Seed. Cirebon, West Java. Seaside with barren soil
136		*C. usaramoensis* E. G. Baker	Oct. 10. Seed. Cameron Highlands, Malaysia. Road side in a village
137		*C. usaramoensis* E. G. Baker	Nov. 13. Seed. Berastagi, North Sumatera. Waste land near field
138		*C.* sp.	Nov. 16. Seed. Kabanjahe, North Sumatera. Road side dry land
139		*C.* sp.	Nov. 20. Seed. Solok, West Sumatera. Waste land near field

140		*C.* sp.	Dec. 5. Seed. Mempawah, West Kalimantan. Waste land
141		*Desmodium umbellatum* DC.	Nov. 1. Seed. Parepare, South Sulawesi. Road side on the hill
142		*Erythrina* sp.	Nov. 5. Seed. Bulkumba, South Sulawesi. Jungle
143		*Flemingia congesta* Roxb.	Oct. 20. Seed. Sukabumi, West Java. Grove near village
144		*Indigofera tinctoria* L.	Oct. 29. Seed. Mojosari, East Java. Railway side
145		*Mucuna acuminata* Grah. ex Baker	Dec. 19. Seed. Pontianak, West Kalimantan. River side
146		*M. bennettii* F. Muell.	Dec. 10. Seed. Bogor, West Java. Road side in suburb
147		*M.* sp.	Nov. 6. Seed. Bulkumba, South Sulawesi. Waste land near a human habitation
148		*Pachyrrhizus erosus* (L.) Urban	Dec. 7. Seed. Semarang, Central Java. Fence of home garden
149		*P. erosus* (L.) Urban	Dec. 6. Seed. Madiun, East Java. Waste land near home garden
150		*Phaseolus aureus* Roxb.	Nov. 1. Seed. Makale, South Sulawesi. Field on foot of mountain
151		*Pithecellobium* jiringa Prain	Nov. 14. Seed. Kabanjahe, North Sumatera. Waste land
152		*Psophocarpus tetragonolobus* DC.	Dec. 9. Seed, Pod. Bandung, West Java. Field in suburb
153		*P. tetragonolobus* DC.	Dec. 9. Seed, Pod. Bandung, West Java. Ridge between the rice fields
154		*P. tetragonolobus* DC.	Nov. 21. Seed, Pod. Cupak, West Sumatera. Low land
155		*P. tetragonolobus* DC.	Dec. 16. Seed, Pod. Sambas, West Kalimantan. Low land
156		*Sesbania grandiflora* (L.) Pers.	Nov. 30. Seed, Pod. Palembang, South Sumatera. Waste land in suburb
157		*S. grandiflora* (L.) Pers.	Oct. 26. Seed, Pod. Gempol, East Java. Ridge between rice fields
158		*S. grandiflora* (L.) Pers.	Dec. 16. Seed, Pod. Sambas, West Kalimantan. Road side near field
159		*Vigna sinensis* Endl. ex Hassk.	Dec. 9. Seed. Bandung, West Java. Waste land
160	*Lecythidaceae*	*Barringtonia macrostachya* Kurz.	Nov. 29. Seed. Baturaja, South Sumatera. Jungle
161	*Liliaceae*	*Allium cepa* L.	Oct. 10. Bulb. Cameron Highlands, Malaysia. Ridge between fields
162		*A. cepa* L.	Oct. 10. Bulb. Cameron Highlands, Malaysia. Home garden
163		*A. cepa* L.	Oct. 11. Bulb. Cameron Highlands, Malaysia. Ridge between fields
164		*A. cepa* L.	Oct. 12. Bulb. Ipoh, Malaysia. Road side near field
165		*A. cepa* L.	Oct. 12. Bulb. Ipoh, Malaysia. Waste land near field
166		*A. cepa* L.	Oct. 26. Bulb. Surabaya, East Java. Waste land

167		*A. cepa* L.	Nov. 17. Bulb. Padang, West Sumatera. Market
168		*A. sativum* L.	Nov. 26. Bulb. Surabaya, East Java. Home garden
169	*Lythraceae*	*Lagerstroemia indica* L.	Oct. 20. Seed. Sukabumi, West Java. Road side
170	*Malvaceae*	*Hibiscus sabdariffa* L. var. *altissima* Wester	Dec. 16. Seed. Tebas, West Kalimantan. Waste land near field
171		*H. s.* var. *altissima* Wester	Dec. 16. Seed. Tebas, West Kalimantan. Waste land
172		*H. s.* var. *altissima* Wester	Dec. 16. Seed. Sambas, West Kalimantan. Road side near field
173	*Meliaceae*	*Aglaia macrostigma* King	Nov. 29. Seed. Baturaja, South Sumatera. Forest
174		*Lansium domesticum* Coirr.	Oct. 12. Seed. Ipoh, Malaysia. Grove near a human habitation
175		*L. domesticum* Coirr.	Oct. 9. Seed. Tapal, Malaysia. Home garden
176		*L. sandoricum* Keicape	Oct. 9. Seed. Ipoh, Malaysia. Orchard near road
177	*Moraceae*	*Artocarpus* sp.	Nov. 26. Seed. Prabumulih, South Sumatera. Forest
178		*Ficus* sp.	Nov. 14. Seed. Batu Yang, West Kalimantan. Bushland with sandy soil
179		*F.* sp.	Nov. 14. Seed. Batu Yang, West Kalimantan. Bushland with sandy soil
180	*Myrsinaceae*	*Ardisia littoralis* Andr.	Nov. 14. Seed. Batu Yang, West Kalimantan. Bushland with sandy soil
181	*Myrtaceae*	*Eugenia cumini* Druce	Oct. 26. Seed. Gempol, East Java. Home garden
182		*E.* sp.	Nov. 4. Seed. Watangpone, South Sulawesi. Road side in suburb
183		*E.* sp.	Nov. 4. Seed. Watangpone, South Sulawesi. Road side in suburb
184		*Pimenta dioica* Merr.	Nov. 16. Seed. Singkawang, West Kalimantan. Bushland near field
185		*Syzygium malacensis* (L.) Merr. et Perry	Dec. 15. Seed. Mempawah, West Kalimantan. Road side near a human habitation
186		*S. malaceasis* (L.) Merr. et Perry	Dec. 15. Seed. Mempawah, West Kalimantan. Ridge between fields
187		*S. malacensis* (L.) Merr. et Perry	Dec. 16. Seed. Singkawang, West Kalimantan. Market
188	*Oxalidaceae*	*Averrhoa bilimbi* L.	Dec. 8. Fruit, Seed. Tegal, Central Java. Road side market
189		*A. carambola* L.	Dec. 8. Fruit, Seed. Tegal, Central Java. Home garden
190	*Palmae*	*Areca triandra* Roxb.	Dec. 5. Seed. Yogyakarta, Central Java. Road side near a human habitation
191		*A.* sp.	Oct. 12. Seed. Ipoh, Malaysia. Forest
192		*Arenga undulatifolia* Becc.	Nov. 20. Seed. Muala Lings, West Sumatera. Forest
193		*A.* sp.	Nov. 1. Seed. Parepare, South Sulawesi. Forest

194		*Borasus flabellifera* L.	Nov. 2. Seed. Watangpone, South Sulawesi. Jungle
195		*Cocos nucifera* L.	Dec. 10. Fruit. Bogor, West Java. Home garden
196		*Corypha umbraculifera* L.	Nov. 2. Seed. Ujung Pandang, South Sulawesi. Road side in suburb
197		*Cyrtostachys lakka* Becc.	Dec. 18. Seed. Pontianak, West Kalimantan. Riverside
198		*Livistona rotundifolia* (Lam.) Mart.	Dec. 5. Seed. Yogyakarta, Central Java. Road side field
199		*Pigafetta filaris* (Giseke) Becc.	Nov. 13. Seed. Sibolangit, North Sumatera. Jungle
200		*Pholidocarpus mucronatus* Becc.	Nov. 26. Seed. Muaraenim, South Sumatera. Valley
201		*Pritchardia thurstonii* F. Muell. et Druce	Nov. 6. Seed. Ujung Pandang, South Sulawesi. Road side near a human habitation
202		*Ptycosperma ambigium* Becc.	Dec. 5. Seed. Yogyakarta, Central Java. Home garden
203		*P. hospitum* Burret	Oct. 20. Seed. Sukabumi, West Java. Home garden
204		*P. macarthurii* (H. Wendl.) Nich.	Oct. 12. Seed. Kuala Lumpur, Malaysia. Forest
205		*Salacca edulis* Reinw.	Nov. 4. Seed, Fruit. Watangpone, South Sulawesi. Home garden
206	*Pandanaceae*	*Pandanus* sp.	Nov. 15. Plant. Tebingtinggi, North Sumatera. Fence of home garden
207	*Passifloraceae*	*Passiflora ligularis* Juss.	Oct. 10. Seed. Cameron Highlands, Malaysia. Waste land near village
208		*P. foetida* L.	Oct. 31. Seed. Parepare, South Sulawesi. Waste land on the hill
209		*P. foetida* L.	Dec. 9. Seed. Bandung, West Java. Waste land in suburb
210		*P.* sp.	Nov. 14. Seed. Berastagi, North Sumatera. Waste land
211	*Proteaceae*	*Helicina attenuata* Bl.	Nov. 15. Seed, Fruit. Prapat, North Sumatera. Forest near village
212	*Rubiaceae*	*Ixora javanica* DC.	Nov. 29. Seed. Lahat, South Sumatera. Forest
213		*Morinda citrifolia* L.	Oct. 26. Seed. Mojokerto, East Java. Road side near a home garden
214	*Rutaceae*	*Citrus* sp.	Dec. 7. Seed. Madiun, East Java. Road side near field
215		*C.* sp.	Dec. 16. Seed. Tebas, West Kalimantan. Home garden
216	*Sapindaceae*	*Erioglossum rubiginosum* Bl.	Oct. 31. Seed. Parepare, South Sulawesi. Forest
217		*Nephelium lappaceum* L.	Nov. 29. Seed. Lahat, South Sumatera. Road side near a human habitation
218		*N.* sp.	Nov. 15. Seed. Singkawang, West Kalimantan. Market
219	*Sapotaceae*	*Manilkara zapote* (L.) Royen	Oct. 10. Seed. Ipoh, Malaysia. Road side near village
220		*M. zapote* (L.) Royen	Dec. 12. Seed. Bogor, West Java. Market

221	*Solanaceae*	*Capsicum annuum* L.	Oct. 31. Seed. Parepare, South Sulawesi. Waste land near field
222		*C. annuum* L.	Nov. 18. Seed. Sicincin, West Sumatera. Home garden
223		*Lycoperisicum esculentum* Mill.	Nov. 1. Seed. Makale, South Sulawesi. Riverside near village
224		*Solanum aculeatissimum* Jacq.	Dec. 18. Seed. Pontianak, West Kalimantan. Waste land near airport
225		*S. melongena* L.	Oct. 31. Seed. Parepare, South Sulawesi. Bush near forest
226		*S. melongena* L.	Nov. 21. Seed. Solok, West Sumatera. Waste land near village
227		*S.* sp.	Nov. 20. Seed. Muala Lings, West Sumatera. Waste land near field
228		*S. torvum* Sw.	Oct. 18. Seed. Sukabumi, West Java. Waste land on foot of mountain
229	*Sterculiaceae*	*Sterculia macrophylla* Vent.	Nov, 29. Seed. Teluk, South Sumatera. Jungle
230		*S. parviflora* Roxb.	**Nov. 25. Seed. Betung, South Sumatera.** Forest
231	*Zingiberaceae*	*Curcuma aeruginosa* Roxb.	Oct. 13. Rhizome. Ipoh, Malaysia. Marsh land
232		*Elettaria cardamomum* Maton	Dec. 18. Seed. Sukabumi, West Java. Ridge between fields
233		*Zingiber officinale* Rosc.	Oct. 12. Rhizome. Ipoh, Malaysia. Marsh land near a human habitation
234		*Z. officinale* Rosc.	Oct. 13. Rhizome. Kuala Lumpur, Malaysia. Market
235		*Z. officinale* Rosc.	Oct. 27. Rhizome. Surabaya, East Java. Riverside in suburb
236		*Z. officinale* Rosc.	Oct. 27. Rhizome. Surabaya, East Java. Waste land near fields
237		*Z. officinale* Rosc.	Oct. 27. Rhizome. Mojokerto, East Java. Waste land near fields
238		*Z. officinale* Rosc.	Nov. 14. Rhizome. Marek, North Sumatera. Riverside in village

Table 2. Numerical data on the morphology of seeds and fruits in the collection. Code numbers used in this table are corresponding to the strain number used in Table 1. (Mean values with s. d.)

Code No.	Materials	Length	Width	Thickness	Weight
		cm	*cm*	*cm*	*gr*
1	Seed	1.38±0.91	0.75±0.08	2.75±0.08	0.15± 0.07
6	Seed	6.72±0.22	3.17±0.02	2.6 ±0.55	27.97± 2.62
7	Fruit	16.46±0.27	9.54±0.28	8.80±0.43	253.00±28.41
	Seed	6.78±0.59	2.95±0.22	1.61±0.16	17.93± 4.58
8	Fruit	10.62±2.63	7.72±3.23	—	212.00±45.18
	Seed	5.52±0.22	2.87±0.17	1.34±0.07	11.40± 2.10
9	Fruit	7.87±1.21	7.80±1.41	—	175.00±25.45
	Seed	5.41±0.34	2.60±0.31	1.40±0.10	13.16± 2.27
10	Fruit	11.23±1.42	7.83±1.33	7.46±1.02	201.40±46.35
	Seed	6.50±1.04	3.87±0.27	1.42±0.32	18.02± 6.70
11	Fruit	11.50±1.03	10.35±0.85	7.28±1.60	238.00±44.33
	Seed	6.23±0.41	3.88±0.06	3.26±0.16	47.93± 8.26

12	Seed	1.64±0.07	1.02±0.06	0.50±0.04	0.41±0.03
13	Seed	3.41±0.08	1.97±0.68	1.18±0.85	3.43±0.68
14	Fruit	2.21±0.10	1.80±0.18	—	—
	Seed	0.72±0.05	0.55±0.07	0.16±0.03	0.09±0.01
15	Seed	0.85±0.05	0.53±0.04	0.25±0.01	0.11±0.02
53	Seed	0.70±0.05	0.48±0.05	0.33±0.07	0.12±0.03
63	Seed	0.56±0.07	0.36±0.03	0.15±0.09	0.09±0.01
68	Seed	0.81±0.03	0.52±0.04	0.36±0.03	0.10±0.03
69	Seed	0.72±0.03	0.56±0.05	0.43±0.04	0.14±0.06
71	Seed	1.78±0.08	0.85±0.06	0.32±0.03	0.19±0.03
72	Seed	1.16±1.00	0.71±0.02	0.24±0.04	0.10±0.02
73	Seed	1.24±0.04	0.70±0.02	0.26±0.02	0.11±0.02
74	Seed	0.87±0.10	0.60±0.03	0.20±0.01	0.52±0.03
75	Seed	1.23±0.06	0.74±0.03	0.31±0.02	0.10±0.01
76	Seed	1.29±0.06	0.69±0.02	0.35±0.04	0.15±0.02
77	Seed	1.23±0.06	0.74±0.05	0.41±0.03	0.14±0.04
78	Seed	1.34±0.84	0.84±0.08	0.40±0.03	0.23±0.03
79	Seed	1.20±0.03	0.65±0.03	0.37±0.01	0.18±0.04
103	Seed	2.11±0.09	2.03±0.10	0.57±0.03	1.03±0.04
104	Fruit	3.64±0.18	4.42±0.78	—	33.00±4.52
	Seed	1.48±0.06	0.99±0.08	0.40±0.06	0.30±0.06
105	Seed	0.59±0.03	0.66±0.05	0.65±0.05	0.25±0.03
106	Fruit	2.20±0.45	2.50±0.50	2.20±0.25	5.50±0.08
	Seed	1.19±0.06	0.77±0.06	0.67±0.04	0.40±0.06
107	Seed	2.0 ±0.08	1.10±0.12	—	1.31±0.14
123	Fruit	6.09±0.33	6.53±0.11	—	94.40±7.20
	Seed	1.28±0.08	1.71±0.17	0.54±0.10	0.60±0.05
127	Seed	1.97±0.15	1.58±0.08	1.22±0.16	1.91±0.15
129	Seed	1.61±0.13	1.03±0.11	1.01±0.18	0.46±0.16
130	Seed	1.56±0.06	1.04±0.03	0.82±0.03	0.61±0.04
132	Seed	0.70±0.07	0.45±0.09	0.15±0.03	0.33±0.04
133	Seed	0.96±0.05	0.61±0.02	0.31±0.03	0.28±0.02
136	Seed	0.35±0.02	0.41±0.03	0.21±0.02	0.003
138	Pod	4.16±0.15	1.07±0.13	0.85±0.04	—
	Seed	0.32±0.02	0.37±0.02	0.21±0.02	0.003
139	Pod	3.77±0.06	0.82±0.02	0.67±0.02	0.34±0.04
	Seed	0.34±0.03	0.39±0.03	0.21±0.02	0.005
142	Seed	1.37±0.12	0.70±0.03	0.67±0.04	0.26±0.06
144	Fruit	2.74±0.16	0.18±0.02	0.15±0.01	—
145	Seed	1.56±0.04	1.35±0.07	0.70±0.01	1.16±0.12
146	Seed	1.58±0.67	1.16±0.05	0.72±0.03	1.09±0.13
149	Seed	0.73±0.08	0.76±0.07	0.39±0.07	0.21±0.11
151	Seed	2.90±0.24	2.91±0.22	2.01±0.11	8.93±1.35
152	Seed	0.99±0.07	0.81±0.04	0.71±0.05	0.31±0.05
153	Seed	0.92±0.03	0.94±0.04	0.81±0.04	0.65±0.01
154	Seed	0.85±0.04	0.72±0.03	0.60±0.02	0.31±0.01
155	Seed	1.00±0.03	1.01±0.05	0.96±0.02	0.41±0.04
156	Pod	29.10±11.17	0.81±0.60	3.62±0.19	32.00±8.41
	Seed	0.66±0.33	0.42±0.01	0.24±0.02	0.42±0.03
159	Seed	0.50±0.07	0.84±0.09	0.39±0.04	0.11±0.04
160	Seed	2.73±0.06	0.78±0.10	0.70±0.10	1.01±0.32
173	Fruit	6.30±0.18	5.42±0.17	—	65.11±4.38
	Seed	5.55±1.29	3.91±0.88	3.50±0.84	15.35±2.04
174	Seed	1.48±0.08	0.97±0.25	0.62±0.40	0.20±0.08
176	Seed	1.61±0.19	1.37±0.24	0.78±0.11	3.35±2.67
178	Seed	0.57±0.05	0.51±0.02	0.50±0.01	0.05±0.01

179	Seed	0.50±0.03	0.40±0.03	0.40±0.03	0.04±0.01
181	Seed	1.48±0.12	0.98±0.08	0.39±0.02	0.40±0.08
182	Seed	1.21±0.05	1.06±0.16	0.66±0.12	0.46±0.18
185	Fruit	6.81±0.51	5.81±0.24	—	—
	Seed	1.71±0.06	2.34±0.12	2.11±0.95	3.80±0.30
186	Fruit	5.63±0.32	4.56±0.12	—	—
	Seed	1.90±0.10	2.70±0.11	2.39±0.16	6.42±1.19
187	Fruit	13.04±0.57	7.22±0.55	—	—
	Seed	3.55±0.45	2.75±0.10	2.30±0.25	10.90±3.11
188	Fruit	9.96±1.41	6.70±0.50	—	110.48±25.43
	Seed	1.00±0.06	0.77±0.03	0.34±0.01	0.06±0.01
189	Fruit	9.86±0.82	7.13±0.50	—	110.04±19.08
	Seed	1.10±0.02	0.77±0.03	0.34±0.04	0.06±0.01
190	Seed	1.71±0.07	1.04±0.05	1.03±0.03	1.24±0.12
191	Seed	1.25±0.02	0.60±0.02	0.57±0.02	0.30±0.03
192	Seed	3.00±0.25	1.60±0.05	1.00±0.06	2.77±0.10
193	Seed	2.03±0.15	1.35±0.17	1.16±0.08	2.28±0.64
194	Seed	5.74±0.19	5.43±0.09	3.60±0.18	59.50±4.95
195	Fruit	22.80±2.14	18.04±2.38	—	1,900.00± 280
196	Seed	1.15±0.07	1.10±0.10	1.08±0.06	0.86±0.15
197	Fruit	0.86±0.05	0.63±0.02	0.62±0.03	0.21±0.03
	Seed	0.79±0.04	0.56±0.02	0.55±0.02	0.18±0.01
199	Fruit	1.20±0.02	0.95±0.02	—	0.34±0.04
	Seed	0.42±0.03	0.76±0.33	0.60±0.03	0.12±0.01
200	Seed	4.85±0.05	4.60±0.10	4.32±0.02	34.85±0.65
202	Seed	1.30±0.06	0.61±0.07	—	0.31±0.01
203	Seed	1.25±0.02	0.55±0.01	0.55±0.01	0.21±0.02
204	Seed	1.21±0.06	0.51±0.08	0.56±0.04	0.12±0.01
205	Seed	1.65±0.28	1.06±0.16	—	1.41±0.24
207	Fruit	7.75±0.75	6.02±0.21	—	—
	Seed	0.63±0.07	0.39±0.06	0.17±0.03	0.012
208	Seed	0.58±0.05	0.38±0.03	0.30±0.01	0.013
209	Seed	0.61±0.08	0.49±0.01	0.30±0.01	0.013
210	Seed	0.67±0.03	0.39±0.02	0.16±0.03	0.012
211	Fruit	4.12±0.27	3.42±0.27	3.87±0.09	20.90±0.3
	Seed	2.60±0.30	2.95±0.05	2.67±0.21	18.00±4.60
213	Seed	0.95±0.03	0.56±0.07	0.25±0.02	0.08±0.01
214	Seed	0.70±0.03	0.51±0.04	0.41±0.02	0.08±0.01
215	Seed	1.14±0.37	0.60±0.30	0.47±0.05	0.16±0.03
216	Seed	1.03±0.16	0.64±0.14	0.54±0.13	0.18±0.09
217	Fruit	4.36±0.13	3.82±0.27	—	—
	Seed	1.91±0.14	1.21±0.03	0.67±0.03	1.13±0.03
219	Seed	2.17±0.11	1.02±0.05	0.51±0.04	0.51±0.05
220	Seed	2.08±0.23	1.11±0.10	0.48±0.02	0.46±0.04
228	Seed	0.44±0.06	0.38±0.02	0.18±0.01	0.03±0.01
229	Seed	1.87±0.14	1.21±0.17	1.05±0.66	1.23±0.62
230	Seed	1.69±0.09	1.21±0.08	0.89±0.05	1.21±0.20

Habitats of Wild Rice Collected

Distributions of wild *Oryza* species in Indonesia have been reported by many workers[4,15,26]. At the same time, a lot of wild species and strains of the genus *Oryza* have been collected and preserved as important genetic stocks. It is desirable that these specimens should be renewed during the respective terms

for the purpose of maintaining the genetic reliability. Therefore, one of the authors' aims was to make up a wide collection of species and strains of wild *Oryza*. Twelve strains belonging to 2 species of wild *Oryza* were collected in Indonesia, *i.e.*, in North Sumatera, South Sumatera and West Kalimantan. Ten strains of them collected were from *Oryza officinalis* Wall. and 2 strains were from *O. ridleyi* Hook. However, the authors had to give up collecting the wild *Oryza* species belonging to A genome-group, owing to various causes, mainly made up of the differences in the time of flowering. Detailed descriptions on the morphological characters of husked and unhusked grains of wild *Oryza* species collected, were made in the previous paper, including grainfullness and some considerations on the ecotypic differentiations [18)]

Characteristics of the collected plants and the main localities of these habitats are given briefly as follows: In the strains of *O. officinalis*, 2 types, in view of plant height, were observed, being nominated higher and lower types.

Higher type specimens collected have the following characteristics; Plants 240*cm* long, leaf blades 33.0 to 58.6*cm* long, 2.5 to 3.0*cm* wide. Panicles 32*cm* long, spreading widely at maturity. Spikelets shedding easily, 4.3 to 4.7 *mm* long, 2.2 to 2.5*mm* wide, 1.2 to 1.3*mm* thick, 1.8 to 2.1 in ratio of grain length to grain width, 3.4 to 3.9 in ratio of grain length to grain thickness, 1.8 to 1.9 in ratio of grain width to grain thickness, awns 5 to 11 *mm* long.

Lower type specimens collected have the following characteristics; Plants 137 *cm* long, leaf blades 25.5 to 54.2 *cm* long, 1.7 to 2.0 *cm* wide. Panicles 25.5 *cm* long, spreading widely at maturity. Spikelets shedding easily, 4.4 to 4.5 *mm* long, 2.1 to 2.3 *mm* wide, 1.1 to 1.2 *mm* thick, 1.9 to 2.2 in ratio of length to width, 3.6 to 4.0 in ratio of length to thickness, 1.9 in ratio of width to thickness, awns 6 to 9 *mm* long.

Populations of this species were found in many districts; Payah Nibung in North Sumatera, Lokong Terusan, Kertapati and Betung in South Sumatera, and Sungai Tanjung and Sungai Duri in West Kalimantan.

In Payah Nibung, the plants were noted to be growing in a ditch, which was about 1 *m* wide. It was adjacent to rubber tree plantation at the east side and paddy field at the west side. They were not shaded. From the view point of plant-height, two types were found in this district, *i.e.*, higher and lower types. The plants were called "Padi Hutan".

In Lokong Terusan, the plants were growing in a wet waste land (2*m*×3*m*), which was separated from the river by a small road, and surrounded by human habitations and small factory of roofing tiles, on the other three sides. They were not shaded, but there were only 3 plants growing. The plants were called "Padi Ketpat".

In Kertapati, the plants were growing in a road side open tank (5*m*×6*m*), in which many plants were growing in a group.

In Betung, the plants were growing on each side of a stream running slowly along the back of human habitation, the river side getting into flooding in rainy

season, and the road side into ditch. They were usually shaded by some trees, though occasionally un-shaded, growing together with other *Gramineae* grasses.

In Sungai Tanjung, they were observed to be growing in road side ditches, not shaded and only 2 plants growing.

In Sungai Duri, they were noted to be growing in road side open tanks (1.5*m*×2.0*m*) and in road side ditches. From view point of plant-height, two types were found in this district. The natives called the lower type plant "Padi Pipit".

This species was always noted to be growing in the localities adjacent to a human habitation.

In the strains of *O. ridleyi,* the collected specimens have the following characteristics; Plants about 170*cm* long, leaf blades 15.5 to 42.5*cm* long, 1.4 to 2.1*cm* wide. Panicles 30*cm* long, spreading widely at maturity. Spikelets shedding easily, 11.6 to 12.1*mm* long, 2.3 to 2.5*mm* wide, 1.4*mm* thick, 4.8 to 5.2 in ratio of length to width, 8.4 to 8.6 in ratio of length to thickness, 1.6 to 1.8 in ratio of width to thickness, awns about 20*mm* long.

Populations of this species were found in the following districts, *i.e.*, regions near Sekayu and near Prabumulih in South Sumatera.

The plants were found about 35 *km* east from Sekayu. They were noted to be growing in a road side forest swampy and gloomy, situated 1*m* below the road. In case of some plants observable in a forest about 30 *km* south from Prabumulih, the conditions of the natural habitat seem to be almost the same as those of the locality mentioned above.

Outline of Agriculture of the Surveyed Districts in Indonesia

Indonesia is an archipelago extending both between the Pacific and the Indian Oceans and between Asia and Australia. The area of land is about 1,903,650 square *km.* The whole territory extends 5,144*km* from east to west and 1,769 *km* from north to south. The largest island includes Sumatera which is about 470,138 square *km*; Kalimantan (the Indonesian part of Borneo, about two-thirds of the whole island), 538,720 square *km*; Sulawesi, 189,456 square *km*; Java, 132,608 square *km*; West Irian, 419,580 square *km.* Thousands of smaller islands are only a few square *km* in extent.

The climate of Indonesia owes much to the insularity of the country, with its position sitting astride the equator, and its location lying between the two continents of Asia and Australia. The first two factors ensure a very even, and generally high temperature throughout the year. Generally, the highest temperature is experienced in the plains along the coast, but in the mountain areas, it is much cooler. Temperature ranges between 35°*C* and 19°*C* and above 600 *m* the conditions are temperate, though the annual averages of temperature ranges between 27°*C* and 29°*C.* Rainfall is more varied in amount and regularity than temperature, and the rainy seasons also differ from island to island. From June to October, Indonesia is subject to the east monsoon which originates from Australia and becomes south-west wind as it crosses the equator,

linking with the main Asian monsoon. The east monsoon creates dry season for most parts of Indonesia. The west monsoon is within the period from December to March. It originates as north-east wind from the South China Sea and the Western Pacific, and becomes west after crossing the equator. This west monsoon is an important source of rain for the archipelago. Rainfall varied greatly with difference of localities. The average rainfall over the whole island of Kalimantan is approximately 3,750 *mm*. Rainfall in Sulawesi averages between 522 and 2,900 *mm*. The annual averaged rainfalls in northern Sumatera, eastern Sumatera and western Sumatera are about 3,000, 2,700 and 3,100 *mm*, respectively. In Java, the rainfall in Jakarta averages 1,767 *mm* and in Bogor 4,147 *mm*.

The population in Indonesia in 1971 census showed a total population of 114,890,347, an increase of almost 18 million compared with the census figures of 1961. The rate of increase of population is generally taken at 2.3—2.5 percent each year. The striking features about the population distribution in Indonesia are those of Java and Madura, which represent less than 7 percent of the total land area, contain almost 65 percent of the population, while Kalimantan and West Irian, which together make up more than half the area of Indonesia, contain only a little more than 5 percent of the population.

Agriculture ranks the most important position on the state economy in Indonesia. In 1971 census in Indonesia, persons of 63 percent among the total number of employment occupy themselves in agriculture, and 45 percent of the yields among the total production is taken from agriculture. The rates of in-

Table 3. Agricultural products of Indonesia * (1,000 *ton*)

	1968	1969	1970	1971
FOOD CROPS				
Rice	10,166	10,642	12,168	12,769
Corn	3,165	2,292	2,825	2,632
Cassava	11,356	11,034	10,478	10,042
Sweet potato	2,364	3,021	2,175	2,154
Soybean	420	389	488	475
Peanuts	287	267	281	280
ESTATES				
Rubber	204	224	231	234
Palm oil	181	189	217	242
Tea	43	40	43	48
Sugar	602	702	706	835
Coffee	14	13	15	18
SMALL HOLDERS				
Rubber	531	556	571	572
Tea	33	22	21	24
Sugar	203	220	196	211
Coffee	144	162	170	178
Tabacco	54	73	69	69
Coconut	1,131	1,220	1,198	1,147
Pepper	47	17	17	24
Kapok	22	29	30	29

* From Indonesia Handbook (1972)[8].

crease of yield in agriculture from 1960 to 1966, from 1966 to 1968 and from 1968 to 1971 are 2.0, 2.6 and 3.6 percent in annual average, respectively. The area of the agriculture land is only 7 percent and the area of forest is 80 percent in the total area of the land in Indonesia.

The main food crops in Indonesia are rice, corn, cassava, soybean, sweet potato and peanut, and the rate of the cultivated area of each crop is 63 percent in rice, 26 percent in corn, 13 percent in cassava, 5 percent in soybean, 3 percent in sweet potato and peanut. On the other hand, industrial crops in Indonesia are rubber tree, oil palm, coconut palm, tea, sugarcane, coffee, tabacco and pepper, and some productions from these crops occupy the important positions on export. The values of exports of the main productions in 1971 are about 223 million US $ in rubber, 46 million US $ in palm oil, 14 million US $ in copra, 28 million US $ in tea, 20 million US $ in tabacco and 24 million US $ in pepper (see Tables 3 and 4) [8]

Table 4. Value of exports of agriculture products 1969－1971.*

(in million US $)

Exports	1969	1970	Percentage Increase / Decrease	1971	Percentage Increase / Decrease
Rubber	308.7	290.6	− 5.9	223.1	− 23.2
Wood	52.0	117.3	+125.6	168.7	+ 43.8
Coffee	51.9	65.8	+ 26.8	55.0	− 16.4
Palm oil	23.1	36.8	+ 59.3	46.3	+ 25.8
Tea	16.0	18.7	+ 16.9	28.2	+ 50.8
Pepper	10.8	3.1	− 71.3	24.0	+674.2
Tabacco	16.5	12.5	− 24.2	19.7	+ 57.6
Copra	26.7	32.1	+ 20.2	14.3	− 55.5
Palm Kernel	4.2	5.1	+ 21.4	5.5	+ 7.8

* From Indonesia Handbook (1972)[8]

JAVA

Java is the fourth in area, but it is inhabited by about 64 percent out of Indonesia's total population. A chain of mountains runs from west to east, and is franked in the north by lowlands and in the south by limestone ridges. Most rivers run usually northward. The Solo river and the Brantas are the largest, running on the eastern part of the island, and in the west the Citarum and Cimanuk are the most important. The rivers are mainly used to supply water for irrigation. Java has a north-west monsoon from December to March, bringing much rain, and January is usually the wettest month.

Agriculture of Java;

Indonesia's population converges on Java including Madura, which is one of the most densely populated area in the world. Agriculture in Indonesia has developed mostly on Java, because the circulating means between islands does not grow so far. The cultivated lands of Java account for about 70 percent of the

total of those of Indonesia, and 63 percent of the land of Java has been cultivated. The lowland-fields in Java are irrigated very well, where rice has been mainly cultivated. The cultivation systems in lowland-fields are the double cropping of rice or the rotation of paddy rice with other crops, due to irrigation, but that in hills' fields is the rotation of those crops, due to rain-water. On the other hand, in upland fields, corn, cassava and peanut are the main crops of rotation. The harvested rice field area of Java is 4,306,000 *ha*, accounting for 52 percent of that of Indonesia (in 1971 census), and the other food crops, for instance, corn, peanut, cassava, etc. are as almost the same as the rates of rice on the harvested area. Sugarcane is now yielded almost in all the state- and private-estates in lowland-fields of Java, and the cultivating system of that (rynoso system) is the one characteristic only in Java. That is, the ditches with about 50 *cm* width by 50—100 *cm* depth are digged longitudinally and latitudinally in the cane fields, and the fields are irrigated from rivers even in dry season. Rubber is mainly produced by private estates in the mountainous districts running in west and central Java. The much cooler districts on highlands are horticultural fields and tea estates. The production of horticulture of Java accounts for about 80 percent of total of that of Indonesia (in 1971 census). As roads in Java are provided well, the produced vegetables are sent for cities' markets by motor. The kinds of fruits are abundant, and fruit-gardens of durian, mango, star-apple, ranbutan, pineapple, papaya, banana, etc. were found here and there in villages. Productions of these were also sent for markets in cities.

SULAWESI

Sulawesi is one of the big islands of Indonesia. The whole island is mountainous, and the mountains in the great central ranges average over 3,000 *m*.

The climate is hot, but is tempered by sea winds, which reach every part. Temperature ranges between 27°*C* and 33°*C*, but it falls below 20°*C* at high altitudes on the mountains. Rainfall varies in different parts. At Ujung Pandang of South Sulawesi, rainfall averages 2,900 *mm*, with an average of 132 rainy days, annually.

Agriculture of South Sulawesi;

Plains sweeping along the west coast in central part of South Sulawesi are the main paddy fields. The fields were comparatively provided, forming the districts of double cropping of rice. On the upland-fields, the main crops were corn and cassava, and vegetables were also cultivated. South Sulawesi has also many mountainous lands, and the mountains were covered with lalang grass. The fields were increased by reclamation with farmer's group work. Although the pastures were found here and there in grasslands, numbers of farm animals were only a few. Various vegetables were yielded well on the highland. Productions of farm; pulses, cabbage, carrot, starch and sugar of palms, tobacco, papaya, banana, etc. were found abundantly at the markets.

At Bone, highland of eastern part of South Sulawesi, an enterprise cul-

tivated sugarcane on the reclaimed grassland. Its area was 4,000 *ha* and the mill production ability was of 2,500 *ton*. Cane growth was in favorable condition, though the cultivation method differed from Java's system.

SUMATERA

Sumatera is the second biggest island of Indonesia. The equator divides it into two nearly equal parts. It is 1,786 *km* in length, and its greatest width is 450 *km*. Including the small islands in the surrounding seas, Sumatera has an area of about 470,138 square *km*.

Sumatera consists of a high mountain chain running along the western coast, desending eastwards to a huge tract of flat land where many large rivers are to be found. This mountain chain is called the Bukit Barisan or Parade of Mountains, and contains numerous volcanic peaks ranging in height from 1,524 *m* to more than 3,600 *m*.

The climate is hot and extremely moist, and southern Sumatera has the highest temperatures. Annual temperature for lowlands is about 27°*C*. March, April and May are the hottest months, January and February are the coolest. The west monsoon gives heavier rainfall, and the fall is accentuated in western Sumatera by the high mountains.

Agriculture of North Sumatera;

Rich amounts of water run from Toba lake, the highest and biggest in Indonesia, to plains on eastern part, enabling paddy rice to be cultivated in the plain-fields on the eastern part. The export productions of rubber and palm oil were produced in the parts of hill-lands. Plantations of rubber tree and oil palm are the state- and private-undertakings with the largest scales in Indonesia. These estates have occupied the most important positions on economy, and the production of those account for 70 percent of total production in North Sumatera. Upland rice, corn, cassava, peanut, potato, vegetables, tea (state) and coffee (small holders) are mainly yielded in the upland-field of hill and highland. Vegetables found at the markets were pulses, tomato, cabbage, carrot, etc., and those were observed to have almost the same qualities as those of the Japanese ones.

Agriculture of West Sumatera;

West Sumatera has little lowland-fields of the large scale, under the circumstances that a high mountain chain runs along the west coast of island. Agriculture is carried out on the fields in highlands and on the burnt fields in mountainous lands. The burnt fields have two kinds of system, consisting of the burnt fields of wild grass and that of forest, and the fields extend much on to the districts of height more than 1,000 *m*, where upland rice, corn, pulses and vegetables as main crops are found.

Agriculture of South Sumatera;

Plain of South Sumatera is very nearly made of the unproductive lowland, and its area reaches about 2 million *ha*. The other lands are, for the most part, forests and gardens of rubber tree, gardens of coffee and fruit trees occupying

the small area. The paddy rice is cultivated on the irrigated fields of hills and highlands, where are usually built up the farming settlements. Rubber tree plantations are owned mainly by the small holders, and a few by state and private undertakings, and a new- and re-plantations are being carried out largely now. Replantations of rubber trees on the small holders are carried out by burnt-field farmers. Farmers make a contract of cultivation with the owners of lands for about 3 years and burns the fields of old rubber trees, after burning, they cultivate mainly upland rice there. Although rubber trees are replanted by them, they cultivate pineapple, etc. inter rigdes of rubber trees for 1 or 2 years. On the fields of highlands plantations of coffee plants were found here and there, and new plantations of them were carried out on large scale. Gardens of fruit trees, which are comparatively of large scale, were also found around the village, various fruits being produced and sent for markets.

KALIMANTAN

This is the largest island in Indonesia. About two-thirds of the island belong to the Republic of Indonesia. The general character of the island is mountainous, the whole forming a tangled complex, without any clear-cut nucleus of mountains. The rivers play a very important part as the line along which run the main arteries of the population.

The climate is hot and damp. Regions in the hills and in the interior may be described as temperate. Throughout the whole island, the average temperature is from about 10°*C* to 33°*C*. Except in the hills, temperature never falls below 27°*C*. The average rainfall over the whole island is approximately 3,750 *mm* a year, rain falls most between November and May.

Agriculture of West Kalimantan;

Plains of West Kalimantan are lowlands, on which plantation of coconut and nipa palms extend throughly, but as coconut palm are old, it was assumed that no remarkable rising in the production of copra was to be expected for the scale of the planting area. Although rice was cultivated inside the plantation of coconut palm and in the fields cultivated by cutting the coconut palms, the growths were poor over the whole fields. Rubber trees were found very often on the mountainous lands, and what seemed to be the mountains covered with rubber trees were usually found to be the plantations of rubber trees. Rubber trees were cultivated only by small holders. Small number of gardens of citrus-tree existed on the hill-districts, and the number of other fruit trees was noted to be small, too.

The Morphological and Ecological Characteristics of the Cultivated Annual in 7 Genera

Most of the specimens collected in this survey have been under cultivation since March 1975 in the field with loam soil or in the plastic house, under the climatic conditions as shown in Tables 5 and 6, at The Ibusuki Experimental Botanic Garden of Kagoshima University. Some investigations of the plants

were carried out on the general characteristics, some informations of which are indispensable for the purpose of immediate or genetical utilization. In the present report, the informations obtained in the annual 44 strains belonging to 7 genera, *i.e.*, *Colocasia, Basella, Dioscorea, Arachis, Crotalaria, Psophocarpus* and *Solanum*, are described with the addition of some agronomical evaluations, not so rigid now, on their adaptations and utilities in Kagoshima.

Table 5. Mean monthly temperature and hours of daylight in the field. Daylight observation was carried out by the Bimetal Sunshine Recorder.

Year	Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1975	Max. °C	12.7	13.5	17.1	21.1	25.1	28.3	32.1	32.0	27.6	26.2	21.2	15.0
	Min. °C	4.7	4.7	7.6	12.3	15.8	20.6	23.7	24.4	22.6	18.4	12.0	6.2
	Hours of daylight	4.06	5.00	6.42	5.30	7.30	6.48	9.00	7.54	7.24	6.00	6.18	4.18
1976	Max. °C	13.1	16.7	17.3	21.4	25.0	27.4	30.8	32.9	28.4	—	—	—
	Min. °C	3.6	7.4	8.3	13.4	15.9	20.7	22.5	24.4	19.8	—	—	—
	Hours of daylight	5.00	6.36	6.24	4.48	6.54	6.06	7.36	8.48	6.36	—	—	—

Table. 6. Mean monthly temperature and hours of daylight in the plastic house. Daylight observation was carried out by the Bimetal Sunshine Recorder.

Month	June'75	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.'76	Feb.	Mar.	Apr.	May	June
Max. °C	28.3	32.1	32.0	27.6	33.2	30.2	27.7	28.6	30.4	30.8	31.6	32.6	33.3
Min. °C	20.6	23.7	24.4	22.6	21.5	16.5	15.9	14.1	18.5	17.0	18.5	18.4	21.3
Hours of daylight	6.48	9.00	7.54	7.24	6.00	6.18	4.18	5.00	6.36	6.24	4.48	6.54	6.06

Taro: *Colocasia* spp.

Taro is said to be a native of Southeast Asia[11,13]. There are many strains of taro. However, there has been little papers published on their characters[4]. The authors were enabled to gather the genetic resources as many as possible.

Twenty seven strains collected were as follows; 17 strains of *C. antiquorum* Schott. var. *esculenta* Engl., 5 strains of *C. antiquorum* var. *globulifera* Engl. and 5 strains which have been unidentified. The strains were collected, in many districts, *i.e.*, Cameron Highlands in West Malaysia, Sukabumi and Bogor in west Java, Purwokerto in Central Java, Parepare, Makale and Sengkang in South Sulawesi, Porsea and Prapat in North Sumatera, Sambas, Samalantan, Nyarunkup, Mandor, Sintang Raya and Pontianak in West Kalimantan. Several plants were collected at the home-garden, road side-field, wet waste-land, near riverside and pond-side.

Eleven strains of *C. a.* var. *esculenta* collected were planted in the field at 120×130 *cm* on Apr. 1, 1975. Fertilizers were applied at a level of 105 *kg* N/*ha*, 53 *kg* P/*ha* and 86 *kg* K/*ha*. The crops were harvested and immediately investigated on the general characteristics on Nov. 20, 1975. Results are given in Table 7.

Table 7. Some characteristics of taro (*Colocasia* spp.). Plants were sown at Apr. 1, 1975. Measurements were carried out at Nov. 20, 1975; illustrating mean values of the tested plants. Code numbers used in this table are corresponding to the strain number in Table 1.

Code No.	No. of plants tested	Plant				Leaf						Tuber					Total weight
						Petiole			Blade			Mother			Daughter		
		Height	Diameter of base	No. of leaves	Total weight	Length	Length of sheathed part	Width	Length	Width	Shape	Length	Diameter	Weight	Number	Weight	
		cm	*cm*		*gr*	*cm*	*cm*	*cm*	*cm*	*cm*		*cm*	*cm*	*gr*		*gr*	*gr*
23	2	177.5	12.1	7.5	9,400	107.2	72.0	6.5	88.0	60.2	sagittate	11.7	11.3	2,500	11.0	2,250	4,750
27	2	152.3	8.3	7.5	7,200	101.2	68.0	6.0	81.5	58.7	sagittate	11.3	10.2	920	16.5	2,820	3,740
38	2	148.0	3.4	7.0	6,050	102.0	65.0	4.0	66.0	45.5	sagittate	8.6	6.7	260	35.5	2,200	2,460
39	2	110.5	7.3	5.5	2,310	74.0	46.5	4.2	52.5	38.0	sagittate	11.5	8.0	580	13.0	475	1,055
35	3	126.0	6.7	5.0	3,350	102.0	52.0	3.5	48.0	33.0	ovate	18.3	8.7	1,150	19.5	825	1,975
36	2	134.0	6.9	6.0	1,650	104.0	57.0	4.5	52.0	39.0	ovate	11.1	6.5	410	15.0	400	810
37	2	151.0	4.9	4.0	2,350	116.5	53.0	7.5	48.0	36.5	ovate	7.3	5.8	280	7.0	530	810
40	2	143.5	6.7	6.0	4,200	104.0	66.0	3.5	51.0	38.0	ovate	10.3	8.8	590	43.0	3,010	3,600
41	3	150.1	7.3	6.0	4,200	112.3	65.0	3.3	52.0	37.3	ovate	11.1	9.3	535	21.0	1,485	2,020
42	2	136.5	5.6	6.0	4,520	106.5	62.0	3.5	44.2	32.2	ovate	16.0	8.0	705	18.0	1,225	1,930
43	4	125.5	3.2	4.0	2,105	105.5	46.5	2.5	45.2	29.0	ovate	10.7	5.7	150	9.0	630	780

Table 8. Morphological characters in the genus *Basella*. Plants were sown at Apr. 2, 1975. Measurements were carried out at Aug. 10, 1975; illustrating mean values of 10 plants tested. Code numbers used in this table are corresponding to the strain number in Table 1.

Code No.	No. of plants tested	Vine		Leaf							Fruit				Seed			
				Petiole			blade											
		Length	Diameter of base	Length	Width	Thickness	Length	Width	Weight	No. of stomata	Length	width	Thickness	Weight	Length	Width	Thickness	Weight
		cm	*cm*	*cm*	*cm*	*cm*	*cm*	*cm*	*gr*		*mm*	*mm*	*mm*	*gr*	*mm*	*mm*	*mm*	*gr*
64	10	223.5	1.20	2.41	0.29	0.33	6.91	4.58	1.78	53	5.94	6.91	6.46	0.12	4.37	3.18	3.37	0.03
65	10	158.6	1.08	2.01	0.43	0.38	7.93	6.77	3.08	61	7.04	11.24	9.01	0.36	5.53	4.62	4.20	0.05

Wide variabilities among strains were found in plant size. Plant heights varied within 110.5 and 177.5*cm*. Basal diameters of shoot ranged between 3.2 and 12.1 *cm*. Total weights of plant varied widely within 1,650 and 9,400 *gr*. In the morphological characters of leaf, petioles varied within 74.0 and 116.5 *cm* in length, within 46.5 and 72.0*cm* in length of the sheathed parts, and within 2.5 and 7.5*cm* in width, respectively. Two types were found to be of leaf blade shape, *i.e.*, 4 strains were of sagittate type and 7 strains were of ovate type. Leaf blades ranged between 44.2 and 88.0*cm* in length and between 29.0 and 60.2*cm* in width, respectively. In the morphological characters of tuber, mother tubers varied within 7.3 and 16.0*cm* in length and within 5.7 and 11.3*cm* in diameter of the largest position. The most wide variabilities were found in the number and weight of daughter tuber and in the weight of mother tuber. Weights of mother tuber varied within 150 and 2,500 *gr*. Daughter tubers ranged between 7.0 and 43.0 in number and between 400 and 2,820 *gr* in weight.

Whole strains tested grew normally and formed tubers under the natural environmental condition at Kagoshima. Some considerable variations were observed among them in the whole characters investigated, especially, in the numbers and mean-weights of daughter tuber, which are valuable in view point of marketable interest. It is suggested, therefore, that they may be useful not only as genetic resources for improvement of yielding ability of taro in Japan, but also as commercial varieties in several strains, and in either case, more detailed investigations are needed.

Basella rubra L. var. alba L.

The genus *Basella* is annual or biennial herbs in warm regions[1,22]. Leaves are succulent, alternate and entire. Flowers are bisexual, red or pinkish red in color and not pedicelled in simple racemes. The fruit is false fruit.

Basella is used as a garden vegetable vine. The *Basella* was found on a sunny place near a road side or on garden fence around a house in Sumatera, West Kalimantan and Central Java. Two strains were collected at Sibolangit in North Sumatera and Bukittinggi in West Sumatera. The plant collected at Sibolangit was larger in leaf size than another, almost orbicular in leafshape.

The cultivation was undertaken to ascertain the morphological and other characters. Seeds were sown in the field at 15×15*cm* on Apr. 2,1975. Fertilizers were applied at a level of 100 *kg* N/*ha*, 40 *kg* P/*ha* and 60 *kg* K/*ha* at the basal dressing. Investigations of some characters were carried out Aug. 10,1975. Results are given in Table 8.

Code No. 64 was slenderer in growth-habit than No. 65, which was larger both in vegetative and in reproductive organs; by this, it was suggested that the two are clearly different strains. Leaf blade of No. 65 seemed to be larger than that of the commercial varieties in Japan, and probably the latter may be displaced by the former in near future.

Yams (*Dioscorea* spp.)

It was not in Indonesia archipelago that yams-cultivation was originated, but as it is located very near the place where it was originated, the cultivation has been carried out from very old time in Indonesia[5,7]. At present, strains of yams as genetic resource, introduced from Indonesia to Japan, were comparatively scarce, therefore authors made efforts to collect as many strains of yams as possible.

Twenty four strains collected were as follows; 18 strains of *D. alata* L., 1 strain of *D. bulbifera* L., 2 strains of *D. esculenta* Burk. and 3 strains of *D. pentaphylla* L.

Populations of the genus were found in all the islands surveyed. Some strains were collected at the fields of peasant farmers and market, and others in forest and on waste-land, in bush and grass-lands.

Seventeen strains were planted in the field at 150×100*cm* with stakes on Apr. 1, 1975. Fertilizers were applicated at a level of 123*kg* N/*ha*, 63*kg* P/*ha* and 106*kg* K/*ha*. The crops were harvested and immediately investigated on general characteristics on Nov. 20, 1975. Results are given in Table 9.

Table 9. Some characteristics of yams (*Dioscorea* spp.). Plants were sown at Apr. 1, 1975. Measurements were carried out at Nov. 20, 1975; illustrating mean values of 3 plants tested. Code numbers used in this table are corresponding to the strain number in Table 1.

Code No.	No. of plants tested	Tuber								Vine				
		Number	Length	Width	Thickness	Weight	Color external	Color internal	Shape	Number	Diameter	Color	Shape	Aerial-bulblet
			cm	*cm*	*cm*	*gr*					*cm*			
81	3	2	13.65	16.88	15.60	1,275	white	white	globular	6	0.56	green	4-winged	+
82	3	2	31.75	26.50	19.00	7,800	purple	white	big globular	7	0.75	red	4-winged	+
83	3	2	11.39	10.49	8.06	1,080	purple	red	long slendr	6	0.56	red	4-winged	
84	3	3	6.16	2.69	2.49	110	purple	purple	short slender	3	0.41	light pink	globular	+
85	3	2	37.30	6.14	5.42	1,585	white	white	long	6	0.38	light pink	4-winged	
86	3	2	61.00	5.76	5.12	1,550	white	white	long slender	7	0.50	green	globular	
87	3	2	24.50	11.42	8.24	3,100	purple	red	spindle shaped	9	0.54	red	4-winged	
88	3	5	8.04	3.73	2.19	190	white	white	short slender	6	0.18	green	globular	
89	3	1	11.23	7.90	7.00	270	purple	pinkish purple	spindle shaped	6	0.60	red	4-winged	
90	3	1	38.04	17.03	16.50	3,050	purple	red	spindle shaped	8	0.58	red	4-winged	
91	3	2	18.51	15.16	11.91	2,830	purple	purple	spindle shaped	3	0.60	light pink	4-winged	
92	3	2	23.72	12.23	7.45	1,180	white	white	long slender	7	0.51	white	4-winged	
93	3	1	3.60	1.58	1.47	5	white	white	short slender	1	0.25	pink	4-winged	
94	3	2	23.50	3.25	3.32	260	white	white	long slender	4	0.39	green	4-winged	
95	3	1	18.50	6.41	5.04	285	white	white	spindle shaped	3	0.58	green	globular	
96	3	3	50.30	4.13	3.78	1,310	white	white	long slender	8	0.50	green	4-winged	
98	3	3	23.13	9.31	7.66	2,380	brown	white	globular	—	—	light pink	—	+

+ : Formed

Wide variabilities among strains were found on the morphological characters of tuber harvested. The ranges of the variation of tubers were within 3.60 and 61.00*cm* in length, 1.58 and 26.50*cm* in width and 1.47 and 19.00*cm* in thickness, respectively. In the shape of tuber, 3 strains belonged to "short slender type", 5 strains to "long slender type", 1 strain to "long type", 2 strains to "globular type", 1 strain to "big globular type" and 5 strains to "spindle shaped type", respectively. Six types derived from the combinations of internal and external colors of tuber were observed, *i.e.*, white in the former and white in the latter in 9 strains, purple and white in 1 strain, purple and red in 3 strains, purple and purple in 2 strains, purple and pinkish purple in 1 strain and brown and white in 1 strain. Numbers of tubers per plant ranged within 1 and 5, and weights of tuber per plant varied widely within 5 and 7,800*gr*. Vines varied within 1 and 9 in number and within 0.18 and 0.75*cm* in basal diameter, respectively. Colors of vine were divided into 5 types, *i.e.*, green in 6 strains, red in 5 strains, pink in 1 strain, light pink in 4 strains and white in 1 strain. Shapes of cross-section of vine were found to be 2 types, *i.e.*, 4-winged shape in 12 strains and globular in 4 strains.

As mentioned above, whole strains tested grew normally and formed tubers under the natural condition at Kagoshima. Consequently, they may be useful for improvement of yams as genetic resources in Japan. It is of some interests that 14 strains could not form aerial bulblet though they were usually formed in Indonesia.

Peanut (*Arachis hypogeana* L.)

A strain of peanut was eventually, collected on a waste-land near a field at Berastagi in North Sumatera and it had slender long pods.

Five seeds were sown in the field at 100×50*cm* on Apr. 2,1975. Fertilizers were applicated at a level of 55*kg* N/*ha*, 36 *kg* P/*ha* and 40*kg* K/*ha* as basal dressing. The plants and seeds were investigated on Nov. 10,1975. Results are given in Table 10.

Table 10. Some morphological characters in the genera *Arachis* (Code No. 129) and *Crotalaria*. Code numbers used in this table are corresponding to the strain number in Table 1. (Mean values of 5 plants tested).

Code No.	No. of plants tested	Height of plant	Pod					Seed			
			Length	Width	Weight	No. of seeds/pod	Weight of seeds	Length	Width	Thickness	Weight of 100 grains
		cm	*cm*	*cm*	*gr*		*gr*	*mm*	*mm*	*mm*	*gr*
129	5	25.4	2.8	1.3	1.6	2.3	1.1	16.0	10.0	10.0	43.9
136	5	255.0	3.9	0.8	0.2	44.0	0.1	0.4	0.4	0.2	0.3
138	5	212.0	3.8	0.8	0.2	40.8	0.1	0.3	0.4	0.2	0.3
139	5	187.0	3.7	1.1	0.3	23.6	0.1	0.3	0.4	0.2	0.5
140	5	146.0	2.9	0.3	0.02	9.2	0.02	—	—	—	0.2

The strain belonged to runner-type and produced rather slender pods, containing 2 or more than 2 seeds in each pod and it was like the Valencia type which is rare in Japan.

Crotalaria (*Crotalaria* spp.)

The *Crotalaria* is an annual herb with leaves varying widely in shape and flowers on terminal racemes. It grows on a barren soil or seashore in subtropical and tropical regions and it is also used as green manure or cover plants on the arable lands, especially under tree crops. There are many species of *Crotalaria* in Southeast Asia[11,13,14]. Authors collected *C. anagyroides* H. B. & K. at Cameron Highlands in West Malaysia, *C. retusa* L. at Cirebon in Central Java and *C. usaramoensis* E. G. Baker at Cameron Highlands in West Malaysia and at Berastagi in North Sumatera. Three species collected at Kabanjahe in North Sumatera, at Solok in West Sumatera and at Mempawah in West Kalimantan were not identified. They were almost 50−100*cm* high. *C. anagyroides* was collected in dry waste-land on the way to Cameron Highlands, *C. retusa* in sandy soil of the seashore near Cirebon, *C. usaramoensis* on the waste grassland at Berastagi in North Sumatera, and the three species at road side in North Sumatera, at waste land in West Sumatera and in West Kalimantan.

To ascertain the morphological characters of *Crotalaria*, seeds were sown at the same time with peanut in the field at 120×100*cm*. Fertilizers were applicated at the sowing time at the level of 55*kg* N/*ha*, 36*kg* P/*ha* and 40*kg* K/*ha*. Results obtained are given in Table 10.

The heights of plant varied among the species from 146 to 255*cm*. The size of pods was somewhat smaller than that of plants at the native place in all of the species, though almost similar in the seed-size. Blossoming and fruiting were continued comparatively for a long time.

It is noticeable that *C. anagyroides* has a character of very rapid growth which makes it more useful one than other species, and it has not been introduced from the tropics to Japan until now[16]. Two specimens, *C. usaramoensis* and *C. retusa*, in Japan came only from India, and the present collections in Indonesia are expected to show some different characters.

Goa bean (*Psophocarpus tetragonolobus* DC.)

The goa bean is perennial, dying down to a large taproot during unfavorable season. Its pale violet-blue flowers develop into unforgettable queer pods, which have been provided with four longitudinal papery wings with irregular margins. The pod of goa bean matures into brown papery wing−catcher which may not open to liberate their dozen seeds. When young, the pods are cooked like string bean, rarely the young leaves and shoots are eaten when they are raw, yet.

The goa bean-plants were found rather in moist land and ridge between rice fields in Sumatera, West Kalimantan and Java. Four strains were collected, two in Sumatera, one in West Kalimantan and one in Java, respectively.

To ascertain the morphological characters and adaptability of the strains in Japan, the seeds were sown in pot of 30*cm* in diameter on Oct. 30, 1975, and seedlings were carried out of the thinning to a plant. The five pots were

Table 11. Some characteristics of goa bean (*Psophocarpus tetragonolobus* DC.). Plants were sown at Oct. 30, 1975. Measurements were ceased at Mar. 26, 1976; illustrating mean values of 5 plants tested. Code numbers used in this table are corresponding to the strain number in Table 1.

Code No.	No. of plants tested	Node order of 1st flower	Date of 1st flowering	No. of days from flowering to ripening	Pod						Seed			
					Length	Width	Thickness	Weight	No. of seeds	Weight of seeds	Length	Width	Thickness	Weight
					cm	*cm*	*cm*	*gr*		*gr*	*cm*	*cm*	*cm*	*gr*
152	5	3.5±0.55	Jan. 30,	54.7±4.23	14.5	1.6	1.0	7.3	9.4	4.2	0.9	0.9	0.8	0.4
153	5	18.3±0.94	Feb. 1,	79.8±3.48	29.0	2.0	1.3	16.3	8.0	5.6	1.0	1.2	0.8	0.7
154	5	8.5±0.58	Mar. 12,	68.5±3.50	15.8	1.7	1.0	7.8	7.3	4.6	0.9	0.9	0.8	0.5
155	5	10.3±1.47	Mar. 14,	65.5±1.55	13.5	1.4	1.1	4.9	6.5	2.7	0.8	1.0	0.8	0.4

used to each strain, and placed in a plastic house heated during the winter. The medium in pot was used with loam soil, and the fertilizers were applied after the emergence of the seedlings at the level of 1*gr* N, 0.18*gr* P and 1.2*gr* K per pot. The investigations were carried out on the flowering and maturing times and the investigations of characters of both pods and seeds were carried out, from time to time, till May 31, 1976. Results obtained and mean temperature in the plastic house are shown in Tables 11 and 6, respectively.

The node — orders from bottom, which set the first flower, ranged within 3.5 and 18.3, and their flowering dates varied from Jan. 31 to Mar. 26, 1976. The numbers of days needed for ripening after the flowering, varied within 54.7 and 79.8 days. The pod size of code No.153 was larger than that of the other three strains, the former was 29.0*cm*, and the latter showed 13.5, 14.5 and 15.8*cm* in pod length, respectively. The pod width of No. 153 was 2.0*cm* and those of other strains, were 1.4, 1.6 and 1.7*cm*, respectively. The weights of pod ranged within 4.9 and 16.3 *gr*. The numbers of seeds per pod varied within 6.5 and 9.4. The lengths of seed varied within 0.8 and 1.0*cm*, widths within 0.9 and 1.2*cm* and weights within 0.4 and 0.7*gr*. The characteristics, mentioned above, of the pod and seed were almost similar to those of the strains at the native places. Since the plant produced no flowers during the period from May to Sept. in this experiments, its cultivation is enforced to be limited only in the hot-house in winter. This fact may explain the reason why the cultivation of this plant has not been made in Japan. Judging from its curious pod morphology and perennial habit, this species seems to be made use of as a new marketable in the hot-house.

Solanum spp.

S. melongena L. is one of the important vegetable plants in tropical Asia and in Japan, too. The species is annual in temperate zone, but perennial in tropics.

Authors collected one of *S. aculeatissimum* Jacg., two strains of *S. melongena* L., one of *S. torvum* Sw. and one of *Solanum* sp., not identified, in Indonesia. *S. aculeatissimum* was collected at a waste-land near Pontianak in West Kalimantan, one of *S. melongena* in a bush near a forest at Parepare, in South Sulawesi and in a waste-land near village at Solok in West Sumatera, *S. torvum* at a waste-land at Sukabumi in West Java, and one species at a waste-land at Muala Lings in West Sumatera. The fruits of *S. aculeatissimum* and code Nos. 225 to 227 strains in the collected places had a size almost same as that of hen's egg, or a little more than that while that of *S. torvum* was appreciably much smaller than the former, which made it unsuitable to be used as food.

To ascertain the morphological characters, the field cultivation was conducted. The seeds were sown in the bed with sandy soil on March 20, 1975, and after the emergence, seedlings were transplanted in pots of 10 *cm* in diameter. When plants grew about 10 *cm* high, five plants in each strain were planted in the field at 120×100 *cm*. The fertilizers were applied at the level of 180 *kg* N/*ha*, 120*kg* P/*ha* and 150*kg* K/*ha*. The investigation was carried out on Sept. 20, 1975. Results obtained are given in Table 12.

Table 12. Some characteristics in the genus *Solanum*. Code numbers used in this table are corresponding to the strain number in Table 1. (Mean values of 5 plants tested).

Code No.	No. of plants tested	Height of plant	Width of base of stem	No. of fruits setting	Node order of lst flower	Fruit				
						Length	Width	Weight	No. of seeds	Weight of seeds
		cm	*cm*			*cm*	*cm*	*gr*		*gr*
224	5	111.7	2.4	3.2	16.8	6.4	7.2	169.0	1,519	8.1
225	5	100.0	1.3	17.1	18.5	6.8	3.9	33.5	864	4.3
226	5	72.0	1.0	3.5	18.5	7.4	3.6	48.2	781	4.8
227	5	69.8	1.0	10.6	18.8	4.0	4.7	46.1	1,454	8.9
228	5	98.5	1.0	—	—	1.0	1.1	0.8	50	0.2

The heights among strains varied within 69.8 and 111.7 *cm* and the diameters of stem varied within 1.0 and 2.4 *cm*. The node-orders of the stem from bottom carrying the first flower, ranged from 18.8 to 16.8. The shapes of the fruit in *S. aculeatissimum* and one species, were of the depressed globose, those of two strains of *S. melongena* long and *S. torvum* globose. As to the number of seeds per fruit, *S. melongena* strains varied between 781 and 864, *S. aculeatissimum* was 1,519 and *S. torvum* was 50. The numbers of fruit per plant ranged within 3.2 and 17.1. The roots of *S. torvum* and *S.* one species, were not to be attacked by any nematode, while *S. melongena* and *S. aculeatissimum* were subjected to the pest. Under the consideration of the fact, some trials on the utilizing of those two species as a root-stocks of commercial egg-plants,

coupled with the establishment of some method of protecting the plant from nematode-damage have been under way here in Japan.

Itineraries

Oct. 8 All members arrived in Kuala Lumpur in Malaysia at 18:30 by JAL. Made bazar-collection of various fruit-seeds at night bazar in the city. Received kindly advices from Dr. C. Tamari, Tropical Agriculture Research Center, Japan.

9 Visited Japan Embassy, University of Malaya and National Unity. At Japan Embassy, met Mr. N. Nakamura, K. Sadachi, C. Nakamura and other members. At Univesity of Malaya, met Dr. B. C. Stone, Prof. of Univ. of Malaya, made arrangement on the schedule of survey in Malaysia and went to National Unity with him to have permission of survey in Malaysia, granted.

10 Left Kuala Lumpur at 9:00 by hired car for Cameron Highlands. At Cameron Highlands, visited Agriculture Research Station (tea and vegetables).

11 Left Cameron Highlands at 6:00 by hired car for Butterworth, and were received kindly by Dr. A. Nakane, Trop. Agri. Research Center, Japan, at the Butterworth Station of car, and visited MARDI with him, met Dr. Chuw, chief of rice breeding section, and studied breeding programs in Malaysia. Stayed in Penang.

12 Took excursion to bazar and Botanic Garden of Penang with Dr. A. Nakane. Left Penang at 11:00 for Kuala Lumpur by hired car.

13 Visited Lake Garden, The National Museum and bazar in the city.

14 Visited Univ. of Malaya, National Unity and Immigration Office. Produced reports of survey with Dr. B. C. Stone and exhibited the reports to National Unity. Went to MARDI with Mr. K. Sadachi.

15 Visited Botanic Garden of Univ. of Malaya and were given explanation about the collections from Dr. B. C. Stone. Left Kuala Lumpur for Jakarta in Indonesia by KLM and were kindly received by Dr. Y. Iwata, Central Research Institute for Agriculture, Indonesia, Dr. T. Yamamoto, Trop. Agri. Research Center, Japan, and Mr. T. Uesugi, Japan Embassy. Made arrangements with them on the schedule of survey in Indonesia.

16 Visited office of Indonesia Institute of Science (LIPI) to have permission of survey in Indonesia granted and were requested reappearance to LIPI on 21th Oct. Went to Bogor with Dr. T. Yamamoto.

17 Took excursion to Bogor Botanic Gardens with Dr. T. Yamamoto. Visited Dr. Y. Iwata's house.

18 Surveyed fields of Cimande, Mangis and Puncak Pass districts with the aid of the kind arrangement of Dr. H. Mikoshiba, Trop. Agri. Research Center, Japan.

19 Visited National Biological Institute in Bogor with Dr. Y. Iwata and were requested reappearance after LIPI's procedure. Took excursion to Bogor Botanic Gardens.

20 Took excursion to EIZAI Botanic Garden with Dr. H. Mikoshiba. Met Mr. Kasahara, chief of the garden.

21 Went to Jakarta. Visited Embassy of Japan, LIPI and Police Station.

22 Visited Japan Embassy, LIPI and Department of the Interior of Indonesia.

23 Had all permission-cards of survey in Indonesia, granted. Returned to Bogor and visited National Biological Institute. Met Dr. S. Sastrapradja, Director of National Biological Institute.

24 Visited National Biological Institute and made arrangement with Dr. S. Sastrapradja about survey and counterpart. Agreed on the schedule of research trip in Indonesia.

25 Joined Mr. Sukasdy, the stuff of Bogor Botanic Gardens, to our party. Left Jakarta for Surabaya by GA and made arrangement on a schedule in Surabaya.

26 Surveyed fields. Proceeded to Mojokerto and Gempol by hired car, and returned to Surabaya.

27 Went bazar in the city.

28 Left Surabaya for Ujung Pandang in South Sulawesi by GA and were kindly received by Mr. M. Kuramitsu, Nippon Koei. Visited sugar factory at Bone and met other Japanese specialists.

29 Took excursion to sugarcane plantation and mill aided by the kind arrangement with Mr. M. Kuramitsu and other members. Returned to Ujung Pandang.

30 Got the permissions of research trip in South Sulawesi from Police Station, Government and Armies.

31 Exchanged written contracts about hiring a car for 7 days. Proceeded to Parepare.

Nov. 1 Proceeded to Rantepao.

2 Proceeded to Sengkang.

3 Surveyed around Tempe Lake by car and motor boat. Stayed in Sengkang.

4 Proceeded to Bulukumba.

5 Returned to Ujung Pandang.

6 Proceeded to Malino and returned to Ujung Pandang.

7 Arranged the collected materials.

8 Left Ujung Pandang at 13:30 for Jakarta by GA and went to Bogor by car.

9 Removed to guest-house of Bogor Botanic Gardens from hotel in the city. Got the pratique for collected materials and sent them for Japan by air mail.

10 Stayed in Bogor. Rest.

11 Left Bogor at 4:00 for Jakarta by car introduced by National Biological Institute and left Jakarta for Medan in North Sumatera at 6:30 by GA. Visited Consulate General of Japan and made an itinerary of survey trip with members of Consulate General.

12 Got the permission of Police Station in North Sumatera and made contracts about hiring a car for 3 days.

13 Proceeded to Berastagi, *via* Pantjurbatu. Visited Natural Botanic Gardens at Sibolangit.

14 Proceeded to Balige, *via* Pematangsiantar and Prapat, and returned to Prapat.

15 Returned to Medan from Prapat, *via* Pematangsiantar, Tebingtinggi and Perbaungan.

16 Left Medan at 6:15 for Padang in West Sumatera by GA. Got permission of Police Station in West Sumatera.

17 Went to bazar and made sightseeing in the city.

18 Proceeded to Sepisang, *via* Danau, Bukittinggi and Bonjol, and returned to Bukittinggi.

19 Proceeded to Payakumbuh, *via* Baso and returned to Baso. Proceeded to Sawahlunto, *via* Batusangkar and Solok, and returned to Solok.

20 Proceeded to Sijunjung, *via* Sawahlunto, and returned to Solok by the same way.

21 Returned to Padang, *via* Solok and Cupak.

22 Left Padang at 12:55 for Palembang in South Sumatera by GA.

23 Went to Police Station, Government, GA office and Bank. Got the permission from Police and Government.

24 Went to bazar in the city. Made contract about hiring a car for 5 days.

25 Proceeded to Sekayu from Palembang, and went to Mangunjaya by motor boat and returned to Sekayu.

26 Returned to Palembang and proceeded to Prabumulih, *via* Kertapati.

27 Proceeded to Lahat, *via* Muaraenim.

28 Proceeded to Tebingtinggi and returned to Muaraenim, *via* Lahat. Further proceeded to Baturaja.

29 Returned to Palembang, *via* Bringin and Prabumulih.

30 Arranged the collected materials.

Dec. 1 Left Palembang at 9:00 for Jakarta by GA and went to Bogor by car.

2 Got pratique of the collected materials and sent them for Japan by air mail. Stayed in Bogor.

3 Went to Jakarta and visited Embassy of Japan for explanations of the trips. Returned to Bogor and made contracts about hiring a car for Java trip. Stayed in Bogor.

4 Proceeded to Purwokerto, *via* Cianjur and Bandung. Rainfall all day.

5 Proceeded to Yogyakarta, *via* Wonosobo, Magelang.

6 Proceeded to Madiun, *via* Surakarta and Sragen.
7 Proceeded to Mayong, *via* Ngawi, Cepu, Blora, Rembang, Pati and Kudus, and returned to Kudus, further proceeded to Semarang.
8 Proceeded to Cirebon, *via* Teresono.
9 Returned to Bogor, *via* Bandung.
10 Arranged the collected materials. Stayed in Bogor.
11 Got the pratique of the collected materials and sent them for Japan. Took excursion to C.R.I.A. (Agriculture Research Center) with Dr. H. Mikoshiba. Stayed in Bogor.
12 Visited Industrial Crop Institute with Dr. H. Mikoshiba, and held a meeting with Dr. A. Th. Loebis, Director of I.C.I. Furthermore, visited Department of Agronomy and Pathology, Agriculture Research Center. Stayed in Bogor.
13 Went to Jakarta at 2:00 by car and left Jakarta at 5:25 for Pontianak in West Kalimantan by GA.
14 Got permissions of research trip in West Kalimantan from Government, Police Station and Army.
15 Proceeded to Singkawang.
16 Proceeded to Sambas and returned to Singkawang.
17 Proceeded to Bengkayang and returned to Singkawang.
18 Proceeded to Singaipinyu and Mandor, and returned to Pontianak.
19 Got to Prefectual Government Office and Police Station. Arranged to leave for Kuching in East Malaysia and drew up the final report for LIPI.
20 Went to air^v port at 7:30, but could not take the flight due to the trouble of plane for Kuching. Stayed in Pontianak.
21 Surveyed along the Kepuas river by motor boat. Stayed in Pontianak.
22 Made procedure to get the flight for Jakarta. Stayed in Pontianak.
23 Mr. Sukasdy returned to Bogor. Stayed in Pontianak.
24 Left Pontianak for Jakarta.
25 Left Jakarta for Singapore.
26 Visited Singapore Botanic Gardens.
27 Left Singapore for Bangkok in Thailand.
28 Stayed in Bangkok.
29 Stayed in Bangkok.
30 Left Bangkok for Hong Kong.
31 Left Hong Kong for Japan, and arrived in Kagoshima at 15:00.

Summary

From Oct. to Dec. in 1974, the authors made surveyings on the unused genetic resources as related to crops in Malaysia and Indonesia, and collected a lot of resources. The collected materials were introduced to Japan, and identified and almost all of them have been cultivated in The Ibusuki Experimental Botanic Garden of Kagoshima University for the evaluation.

The collection contained 238 strains, 110 genera and 42 families. The species names with family, and their collected materials, the collection-date, place and -habitat are summarized in Tables 1 and 2.

The planting experiment were made in order to get the informations on the characteristics and adaptabilities in Japan; and some results were obtained in 44 strains from among the collected plants, and they were summarized as follows:

Basella (2 strains): Leaf blade of strain (No. 65) seemed to be larger than those of the commercial varieties in Japan, and superior to them on the vegetable-quality.

Taro (11 strains): Eleven strains were investigated. Whole strains tested, grew normally under the natural environmental conditions. Considerable variations were observed among the strains in the whole characters investigated, especially, in numbers and mean-weights of the daughter tubers. It seems that strains tested are useful as genetic resources for improvement of yielding ability and a few strains may be bred as commercial varieties.

Yams (17 strains): The whole strains tested, grew well and formed tubers under natural environmental conditions. They may be useful, as genetic resources, for the improvement of yams.

Peanut (1 strain): It was of a runner type and pods were rather slender and 2 or over 2 seeds in each, might be looked upon as a Valencia type.

Crotalaria (4 strains): *C. anagyroides* showed the useful characters of rapider growth than *C. retusa*, *C. usaramoensis* and one unknown species, and this has not been introduced as far as we are informed of.

Goa bean (4 strains): All strains could not flower during the term extending from May to Sept. But they seem to be promising as new vegetables in the hot-house-cultivation in the cold season.

Solanum (5 strains): *S. torvum* and one unknown species were not attacked by any nematode pest. Therefore, it was assumed that these species would be promising to be used as a root-stock of egg plant for the purpose of protecting the plants from the serious nematode-damage in Japan.

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