

琉球大学学術リポジトリ

西表島の農耕地雑草と帰化植物の分布ならびに発生の様相(附属農場)

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Distribution of Cropland Weeds and Naturalized Plants in Iriomote Island and Its Aspects in Emergence

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Summary

The kinds, growing quantities and distributions of arable land weeds and naturalized weeds were investigated for the purpose of grasping the actual conditions of weeds in the eastern and western parts of Iriomote Island.

1. As arable land weeds, sugarcane field weeds of 27 families and 131 species, pineapple field weeds of 20 families and 46 species, the weeds common to sugarcane and pineapple field of 22 families and 59 species and paddy field weeds of 25 families and 69 species could be confirmed.

2. Naturalized weeds of 17 families and 78 species could be confirmed. of all of the weed species, 56 families and 305 species could be confirmed.

3. As a result of the investigation on the distributions of weeds, the number of species occurring in sugarcane fields were 174 and the ratio of naturalized weeds among them was 45.7%. The ratio of naturalized weeds was 22.7% among 44 species in sugarcane fields and 12.6% among 63 species in the paddy fields.

4. With respect to the distributions of weeds, weeds of Heguminosae, Gramineae and Compositae were numerous in the sugarcane fields, and those of Gramineae and Compositae were many in the pineapple fields, and Cyperaceae and Gramineae were many in the paddy fields.

5. With respect to a life form composition, TH-R5-D5-e was most dominate in the sugarcane fields and H-R5-D1-e was most abundant in the pineapple fields, and HH-R5-D1-t was most numerous in the paddy fields.

6. Not much difference was seen in the compositions of weeds locally but, generally, *Dactyloctenium aegyptium* Beauv. and *Amaranthus spinosus* L. were many in the Ohara and Toyofara regions.

7. Of the relatively new naturalized weeds, which are vigorously growing or estimated to markedly increased in the future, *Paspalum urvillei* Steud. and *Bidens pilosa* var. *radiata* Scherff.

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Introduction

Iriomote Island is about 430km southwest of Main Island Okinawa and about 180km northeast of Formosa at lat. $24^{\circ}15'-25^{\circ}N$. and long. $123^{\circ}40'-55^{\circ}E$. (Fig.1). Annual precipitation is 2200–2600mm and mean temperature is $23.6^{\circ}C$ (1958–1967) and, from the definition of the subtropics (warmth index: $180-240^{\circ}$) by Kira⁵⁾ (1945), the warmth index is 223.5° (Sonai) and this island belongs to the subtropics near to the tropics.

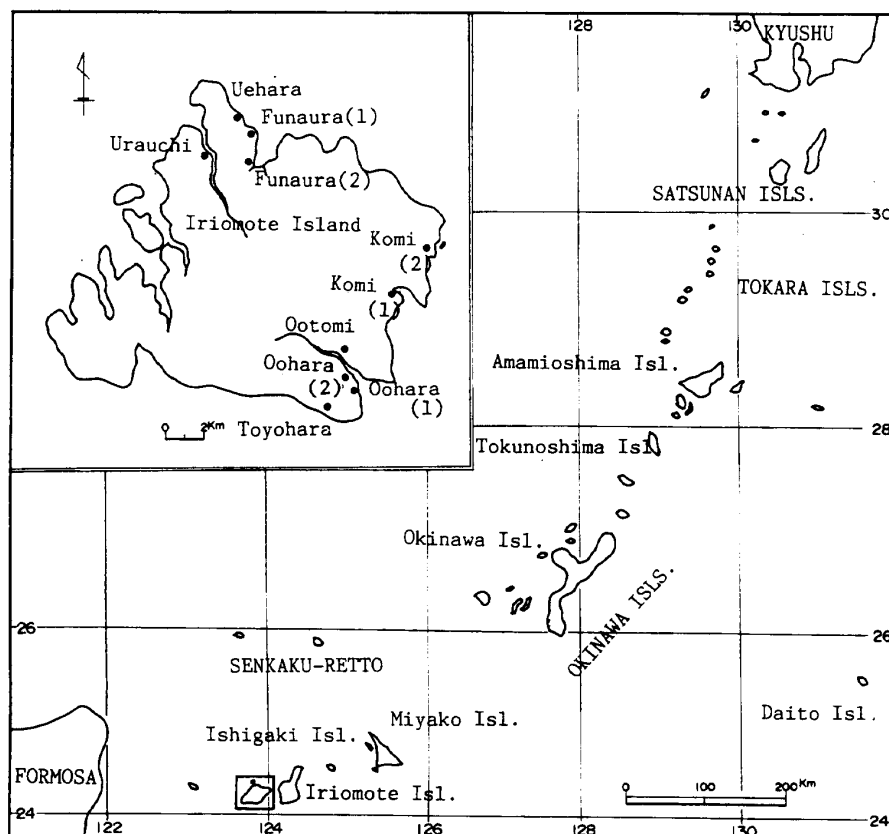


Fig. 1. Geographical location and investigated location of Iriomote Island

Iriomote Island, next to Okinawa in area, is 75.5km in circumference and $270.9km^2$ in area with 90% of the land being occupied by mountains. Most of the land is covered by virgin, undeveloped forest.

The island has many rivers, with most of the flatlands existing on the center part of the island.

Pineapple, sugarcane and rice are the main agricultural products, occupying 40.71%, 14.8% and 11.5% of the total arable land respectively. With respect to the study on the arable land weeds of Iriomote Island, only the paper by Miyawaki¹¹⁾ and research papers on the kinds, growing quantities and distributions of various weeds from the aspect of the control and utilization of weeds are almost nonexistent.

In this study, the kinds, growing quantities and distributions of arable land weeds and naturalized weeds in the croplands of Iriomote Island were investigated. The results obtained are as follows.

Methods for Research Study

Naturalized weeds and arable land weeds growing on the croplands in the eastern and western parts of Iriomote Island were collected and identified from February, 1987 to September, 1988. Arable land weeds were classified into field weeds (weeds of sugarcane and pineapple fields), lowland weeds and common weeds of sugarcane and pineapple fields in pursuance of the papers by Kasahara⁴⁾, Kitamura et al.^{6,7,8)}, Numata¹²⁾, Ohwi^{13,14)}, Otaki¹⁷⁾ and Wtanabe¹⁸⁾ and respectively shown in Table 1-4. The naturalized weeds are shown in Table 5 according to the papers by Osada^{15,16)} and Numata¹²⁾.

The investigation on the distribution of arable land weeds were conducted in the regions centering around the croplands of Urauche. Uehara, Funaura, Komi, Otomi, Ohara and Toyohara from February to November, 1987 and from May to September, 1988 (Fig.1). The croplands were divided into three investigation groups of a sugarcane field, a pineapple field and a paddy field and the respective regions of 4,3,3 of each group were set to areas to be investigated and 20-30 field plots (investigation area : 1-2 ha/each plot) were set for each investigation group. In addition, 1m²-spots were set to each of the field plots at 20 places to investigate the occurring weed species. The occurring frequencies were calculated for each weed species and added up and weed species were classified in order of frequency to provide an index of distribution (Table 6). Further more. the ratio of the number of naturalized weed species to total number was calculated for each field plot. The life forms of the weeds in the table were determined according to the papers by Numata et al.¹²⁾ and Miyawaki¹¹⁾

Results of Investigation and Discussion

1. Kinds of Weeds

The weeds confirmed in this investigation were from 27 families and 131 species in the sugarcane fields, and 20 families and 46 species in the pineapple fields to reach 236 species inclusive of 22 families and 59 species in the weeds common to sugarcane and pineapple fields and the weeds of paddy fields consisted of 25 families and 69 species (Table 1-4).

With respect to weed species having a high occurrence frequency in all of the field plots, *Cyperus rotundus* L., *Youngia japonica* DC., *Acalypha australis* L., *Setaria viridis* Beauv., *Oxalis corniculata* L., *Amaranthus lividus* L., *Sonchus oleraceus* L., *Galium Spurium* L., *Digitaria ciliaria ciliaris* Koel., *Bothriospermum tenellum* Fisch. & Mey. and *Anagalis arvensis* f. *caerulea* Baumg were observed among the sugarcane field weeds and *Ageratum boustonianum* Mill., *Paspalum urvillei* Steud., *Youngia japonica* DC., *Erigeon floridulus* Sch-Bip., *Paspalum vaginatum* SW., *Paspalum dilatatum* Poir., *Ageratum conyzoides* L. and *Crassocephalum crepidioides* S. Moore were seen among the pineapple field weeds, and *Scirpus maritimus* L., *Marsilea quadrifolia* L., *Fimbristylis littoralis* Gaudich., *Scirpus juncooides* var. *hotarui* Ohwi., *Eleocharis aciculatis* Roem., *Sperdela polyrrhiza* Schleid and *Cyperus globosus* All. were observed among the paddy field weeds.

2. Life-form Compositions of Weeds

With respect to life-form compositions of sugarcane field weeds, Th (annual) of 41.2% and

Table 1. Sugarcane field weeds

| Family | Growth form | Occurring weed |
|-----------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chenopodiaceae | A | <i>Chenopodium album</i> ssp. <i>amarahthicolor</i> Caste & Regnier <i>Chenopodium album</i> L. |
| Amaranthaceae | A | <i>Amaranthus lividus</i> L. <i>Amaranthus spinosus</i> L. <i>Amaranthus retroflexus</i> L. <i>Celosia grgentea</i> L. |
| Portulacaceae | A | <i>Portulaca oleracea</i> L. <i>Talinum paniculatum</i> Gaertn. |
| Basellaceae | P | <i>Basella alba</i> L. |
| Caryophyllaceae | WA | <i>Sagina japonica</i> Ohwi |
| | WA | <i>Arenaria serpyllifolia</i> L. var. <i>tenuior</i> Mert. & Koch <i>Stellaria alsine</i> Gimm. var. <i>undulata</i> Ohwi |
| | P | <i>Stellaria aquatica</i> Scop. <i>Cerastium glomeratum</i> Thuill. |
| Ranunculaceae | A | <i>Ranunculus sieboldii</i> . Miq. |
| Papaveraceae | WA | <i>Corydalis heterocarpa</i> var. <i>japonica</i> Ohwi |
| Cruciferae | A | <i>Brassica juncea</i> Czern. & Crosson <i>Brassica rapa</i> var. <i>nippooleifera</i> Kitam. <i>Coronopus didymus</i> Smith <i>Capsella bursa-pastoris</i> Medik. <i>Cardamine parviflora</i> L. |
| | WA | <i>Lepidium virginicum</i> L. |
| | WA | <i>Cardamine parviflora</i> L. |
| | P | <i>Rorippa indica</i> Hieron. <i>Rorippa dubia</i> Hara |
| Crassulaceae | P | <i>Kalanchoe pinnata</i> Pers. |
| | WA | <i>Serum bulbiferum</i> Mak. |
| Rosaceae | P | <i>Rubus parvifolius</i> L. <i>Duchesnea chrysantha</i> Miq. |
| Leguminosae | A | <i>Crotalaria juncea</i> L. <i>Crotalaria assamica</i> Benth. <i>Crotalaria bialata</i> Schrank <i>Trifolium repens</i> L. <i>Casgia mimosoides</i> var. <i>nomame</i> Mak. <i>Melilotus suaveolens</i> Ledeb. <i>Vicia hirsuta</i> S.F.Gray |
| | WA | <i>Medicago polymorpha</i> L. <i>Medicago lupulina</i> L. <i>Vicia tetrasperma</i> Schreb. <i>Vicia sativa</i> L. |
| | P | <i>Mimosa pudica</i> L. <i>Desmanthus Virgatus</i> Willd. <i>Trifolium repens</i> L. <i>Sebania cannabina</i> Pers. <i>Cassia lechenaultiana</i> DC. <i>Vicia angustifolia</i> L. var. <i>segetalis</i> Koch <i>Medicago sativa</i> L. <i>Desmanthus illinoensis</i> MacM. |
| Oxalidaceae | A | <i>Oxalis corniculata</i> L. |
| | P | <i>Oxalis corymbosa</i> DC. |
| Euphorbiaceae | A | <i>Euphorbia thymifolia</i> L. <i>Euphorbia supina</i> Rafin. <i>Euphorbia hirta</i> L. <i>Euphorbia chamaesyce</i> L. <i>Phyllanthus urinaria</i> L. <i>Euphorbia vachellii</i> Hook. & Arn. |
| | P | <i>Euphorbia helioscopia</i> L. <i>Euphorbia hyssopifolia</i> L. <i>Euphorbia hyssopifolia</i> L. |
| Violaceae | P | <i>Viola confusa</i> Champ. |
| Onagraceae | P | <i>Oenothera speciosa</i> Nutt. |
| Umbelliferae | A | <i>Apium leptophyllum</i> F.Muell. |
| | WA | <i>Torilis japonica</i> DC. |
| | P | <i>Centella asiatica</i> Urban |
| Primulaceae | A | <i>Anagallis arvensis</i> f. <i>caerulea</i> Baumg. |
| | WA | <i>Lysimachia mauritiana</i> Lamk. |
| Boraginaceae | WA | <i>Bothriospermum enellum</i> Fosch. & May. |
| Verbenaceae | P | <i>Verlena officinalis</i> L. |

(cont)

| Family | Growth form | Occurring weed |
|------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Solanaceae | A | <i>Solanum nigrum</i> L. <i>Physalis angulata</i> L. <i>Solanum alatum</i> Mperch. |
| Scrophulariaceae | A | <i>Mazus pumilus</i> v.Steenis <i>Veronica javanica</i> Bl. <i>Veronica peregrina</i> var. <i>xalopensis</i> St. John & Warren |
| | WA | <i>Veronica didyma</i> Tenore |
| Rubiaceae | A | <i>Hedyotis diffusa</i> Willd. |
| | WA | <i>Galium spurium</i> l. var. <i>echinospermum</i> Hayek |
| Compositae | A | <i>Xanthium strumarium</i> L. <i>Siegesbeckia orientalis</i> L. <i>Sonchus asper</i> J.Hill. <i>Gnaphalium japonicum</i> Thunb. <i>Emilia javanica</i> Merr. <i>Blumea lacera</i> DC. <i>Sonchus oleraceus</i> L. <i>Eclipta prostrata</i> L. |
| | WA | <i>Lactuca indica</i> L. <i>Erigeron canadensis</i> L. |
| | P | <i>Vernonia cinerea</i> Less. <i>Sonchus arvensis</i> l. <i>Adenostemma lavenia</i> O.K. <i>Ixeris lancolata</i> Steff. <i>Artemisia capillaris</i> Thunb. <i>Bidens pilosa</i> f. <i>decumbens</i> Scherff. <i>Bidens pilosa</i> L. <i>Bidens pilosa</i> var. <i>radiata</i> Scherff. |
| Gramineae | A | <i>Setaria pallidifusca</i> Stapf & Hubb. <i>Digitaria radiosa</i> Miq. <i>Dactyloctenium aegyptium</i> Richter <i>Rottboellia exaltata</i> L.f. <i>Cenchrus brownii</i> Roem. & Schult. <i>Digitaria violascens</i> Link <i>Leptochloa panicea</i> Ohwi <i>Setaria viridis</i> Beauv. <i>Setaria glauca</i> Beauv. <i>Setaria verticillata</i> Beauv. |
| | WA | <i>Eragrostis multicaulis</i> Steud. <i>Chloris barbata</i> Sw. <i>Avena fatua</i> L. <i>Digitaria henryi</i> Rendle <i>Coix lacryma-johi</i> L. |
| | P | <i>Paspalum conjugatum</i> Berg. <i>Paspalum dilatatum</i> Poir. <i>Sorghum haepense</i> Pers. <i>Poa annua</i> L. <i>Lolium perenne</i> L. <i>Ischaemum aristatum</i> L. <i>Muhlenbergia japonica</i> Steud. <i>Sporobolus fertilis</i> W.D.Clayton <i>Chloris gayana</i> Kunth <i>Panicum repens</i> L. <i>Paspalum urvillei</i> Steud. <i>Paspalum orbiculara</i> G.Forst. <i>Desmodium canum</i> Schinz & Thellung |
| Cyperaceae | P | <i>Cyperus brevifolius</i> Hassk. <i>Cyperus rotundus</i> L. |
| Araceae | P | <i>Pinellia ternata</i> Ten. <i>Typhonium ivaricatum</i> Decne. |
| Labiatae | P | <i>Perilla frutescens</i> var. <i>acuta</i> Kudo <i>Stacya arvensis</i> L. |
| Polygonaceae | P | <i>Polygonum chinense</i> L. |

Notes) A : Annual weed, WA : Winter annual weed, P : Perennial weed

Table 2 . Pineapple field weeds

| Family | Growth form | Occurring weed |
|-----------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Schizaeaceae | P | <i>Lygodium japonicum</i> Sw. |
| Gleicheniaceae | P | <i>Dicranopteris dichotoma</i> Bernh. |
| Cyatheaceae | P | <i>Alsophila spinulosa</i> Tryon |
| Pteridaceae | P | <i>Pteridium aquilinum</i> Kuhn var. <i>latiusculum</i> Underw. <i>Sphenomeris chinensis</i> Maxon |
| Moraceae | P | <i>Ficus erecta</i> Thunb. <i>Morus australis</i> Poir. |
| Urticaceae | P | <i>Boehmeria nivea</i> f. <i>viridula</i> Hatusima |
| Rosaceae | P | <i>Rubus rosaefolius</i> ssp. <i>maximowiczii</i> Focke <i>Rubus seicoldii</i> Bl. |
| Leguminosae | P | <i>Pueraria montana</i> Merr. |
| | P | <i>Lespedeza cuneata</i> G. Don <i>Indigofera hendecapnylla</i> Jacq. |
| Euphorbiaceae | P | <i>Macaranga tanarius</i> Muell.-Arg. |
| Vitaceae | P | <i>Ampelopsis brevipedunculata</i> var. <i>hancei</i> Rehd. |
| Malvaceae | P | <i>Hibiscus mutabilis</i> L. <i>Abelmoschus moschatus</i> Medik. |
| Melastomataceae | P | <i>Melastoma candidum</i> D. Don |
| Rubiaceae | A | <i>Galium spurium</i> L. var. <i>echinospermum</i> Hayek |
| | P | <i>Paederia scandens</i> Merr. |
| Compositae | A | <i>Erigeron floridulus</i> Sch.-Bip. <i>Youngia japonica</i> DC. <i>Sonchus olerceus</i> L. <i>Crassocephalum crepidioides</i> S. Moore <i>Erechtites hieraciifolia</i> Rafin. var. <i>cacliooides</i> Grised. <i>Ageratum houstonianum</i> Mill. <i>Lactuca idica</i> L. |
| Gramineae | A | <i>Arhraxon hispidus</i> Mak. <i>Digitaria ciliaris</i> Koel. <i>Eleusine indica</i> Gaertn. |
| | P | <i>Oplismenus compstis</i> Beauv. <i>Paspalum urvilli</i> Steud. <i>Paspalum dilatatum</i> Poir. <i>Paspalum conjugatum</i> Berg. <i>Panicum repens</i> L. <i>Miscanthus sinensis</i> Andes. <i>Imperata cylindrica</i> Beauv. var. <i>maior</i> C.E. Hubb. |
| Cyperaceae | P | <i>Cyperus brevifolius</i> var. <i>leiolepis</i> T. Koyama |
| Commelinaceae | P | <i>Amischotholype hispida</i> Hong |
| Polygonaceae | P | <i>Polygonum chinense</i> L. |
| Oxalidaceae | A | <i>Oxalis coricumata</i> L. |
| | P | <i>Oxalis cormbosa</i> DC. |
| Aspidiaceae | P | <i>Thelypters acuminata</i> Morton |

Table 3. The weeds common to Sugarcane and Pineapple fields

| Family | Growth form | Occurring weed |
|------------------|----------------------------------------|------------------------------------------------------------------------------|
| Aspidiaceae | P | <i>Thelypeteris acuminata</i> Morton |
| Urticaceae | WA | <i>Pouzolzia zeylanica</i> Benn. |
| Polygonaceae | A | <i>Polygonum hydropiper</i> L. |
| | P | <i>Polygonum longisetum</i> be Bruyn <i>Rumex japonicus</i> Houtt. |
| | | <i>Polygonum chinense</i> L. |
| Amaranthaceae | WA | <i>Achyranthes aspera</i> var. <i>rubrofusca</i> Hook.f. |
| Ranunculaceae | P | <i>Clematis grata</i> Wall. var. <i>ryukyuensis</i> Tamura |
| | WA | <i>Ranunculus quelpaertensis</i> Nakai |
| Leguminosae | P | <i>Leucaena leucocephala</i> be Wit |
| | P | <i>Trifolium pratense</i> L. |
| Oxalidaceae | P | <i>Oxalis corniculata</i> L. |
| Eupprbiaceae | A | <i>Acalypha australis</i> L. |
| Sapindaceae | P | <i>Cardiospermum halicacabum</i> L. var. <i>microcarpum</i> Bl. |
| Onagraceae | P | <i>Oenothera rosea</i> Ait. |
| Umbelliferae | P | <i>Hydrocotyle formosana</i> var. <i>maritima</i> (Honda) Hatusima |
| Convolvulaceae | P | <i>Ipomoea acuminata</i> Roem. & Schult. |
| Verbenaceae | P | <i>Verbena brasiliensis</i> Vell. <i>Verbena bonariensis</i> L. |
| | | <i>Stachytarpheta dichotoma</i> Vahl |
| | P | <i>Leucas javanica</i> Benth. <i>Clinopodium gracile</i> O.K. |
| Labiatae | P | <i>Lindernia crustacea</i> F.v.Muell |
| Scrophulariaceae | P | <i>Lindernia anagallis</i> Pennell |
| | | <i>Plantago asiatica</i> L. |
| Plantaginaceae | P | <i>Plantago asiatica</i> L. |
| Compositae | A | <i>Ageratum colyzoides</i> L. <i>Ageratum houstonianum</i> Mill. |
| | | <i>Emilia sonchifolia</i> A.DC. <i>Erigeron annuus</i> L. |
| | | <i>Bidens pilosa</i> L. <i>Gnaphalium japonicum</i> Thumb. |
| | | <i>Gnaphalium luteo-album</i> L. ssp. <i>affine</i> Koster |
| | | <i>Erectites hieraiifolia</i> Rafin. var. <i>cacalioiders</i> Griseb. |
| | WA | <i>Erigeron floridulus</i> Sch.-Bip. |
| | | <i>Erigeron canadensis</i> L. |
| | WA | <i>Youngia japonica</i> DC. <i>Hemistepta lyrata</i> Bunge |
| | | <i>Aster subulatus</i> Michx. |
| | P | <i>Kalimeris indica</i> Sch.-Bip. <i>Taraxacum officinale</i> Weber |
| | | <i>Ixeris debilis</i> A.Gray |
| | | <i>Bidens plosa</i> var. <i>radiata</i> Scherff. |
| | | <i>Artemisia princeps</i> Pamp. var. <i>orientalis</i> Hara |
| | | <i>Ixerisodentata</i> Nakai |
| | | <i>Crassocephalm crepidioides</i> S.Moore |
| Gramineae | P | <i>Eriochola procera</i> C.E.Hubb. |
| | A | <i>Eleusine indica</i> Gaertn. <i>Digitaria ciliaris</i> Koel. |
| | P | <i>Cyoodon dactylon</i> Pers. |
| | | <i>Miscantius sinensus</i> Anders. |
| | | <i>Paspalum orbiculara</i> G.orst. |
| | | <i>Imperata cylindrica</i> Beauv. var. <i>major</i> C.E.Hubb. |
| | <i>Brachiaria subquadripara</i> Hitch. | |
| Cyperaceae | P | <i>Cyperus Kyllingia</i> Endl. <i>Cyperus cyperinas</i> <i>Kyllingia</i> O.K |
| | | <i>Cyperus cyperinus</i> O.K. |
| Araceae | P | <i>Alocasia odora</i> Spach |
| Commelinaceae | A | <i>Commelina diffusa</i> Burm.f. |
| | | <i>Commelina benghalensis</i> L. |
| Liliaceae | P | <i>Allium macrostemon</i> Bunge |

Table 4 . Paddy field weeds

| Family | Grpwth form | Occurring weed |
|------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Marsileaceae | P | <i>Marsilea quadrifolia</i> L. <i>Marsilea crenata</i> Presl |
| Scrophulariaceae | A | <i>Lindernia procumbens</i> Philcox |
| | P | <i>Limnopila sessiliflora</i> Bl. |
| Typhaceae | P | <i>Typha domingensis</i> Pers. |
| Potamogetonaceae | P | <i>Potamogeton distinctus</i> Benn. |
| Alismataceae | P | <i>Sagittaria pygmaea</i> Miq. <i>Sagittaria trifolia</i> L. |
| Hydrocharitaceae | P | <i>Hydrilla verticillata</i> Royle |
| | A | <i>Ottelia aismoides</i> Pers. |
| Gramineae | A | <i>Echinochloa crus-galli</i> var. <i>praticola</i> Ohwi <i>Echinochloa crus-galli</i> var. <i>caudata</i> Kitagawa <i>Echinochloa crus-gali</i> Bequv. var. <i>oryzicola</i> Ohwi <i>Cenahurusn brownii</i> Roem. & Schult. |
| | WA | <i>Pelypogon fugax</i> Steud. <i>Alopecurus aequalis</i> Sobol. var. <i>amurensis</i> Ohwi <i>Poa annua</i> L. <i>Polypogon monospeliensis</i> Disf. |
| | P | <i>Paspalum distiohum</i> L. <i>Ischaemum rugosum</i> Salisb. var. <i>segetum</i> Hack. <i>Arundo donax</i> L. <i>Brachiaria sabquadripara</i> Hitch. <i>Brachiaria mutica</i> Stapf <i>Isachne globosa</i> O.K. |
| Cyperaceae | A | <i>Cyperus globosus</i> All. <i>Cyperus polystachyos</i> Rottb. <i>Cyperus compressus</i> L. <i>Cyperus pilosus</i> Vahl. <i>Cyperus microiria</i> Steud. <i>Scirpus triquetar</i> L. <i>Cyperus iria</i> L. <i>Eleocharis kleocharis kuroguwai</i> Ohwi <i>Fimbristylis littoralis</i> Gaudich. <i>Cyperus seroltinus</i> Rottb. <i>Cyperus tenuispius</i> Steud. <i>Cyperus odoratus</i> L. <i>Fimbristylis eichotoma</i> f. <i>annua</i> Ohwi |
| | P | <i>Scirpus mucronatus</i> L. ssp. <i>robustus</i> T. Koyama <i>Cyperus halpan</i> L. <i>Cyperus alternifolius</i> L. var. <i>obtuangulus</i> T.Koyama <i>Scirpus junocides</i> var. <i>hotarui</i> Ohwi <i>Eleocharis aciculais</i> Roem. & Schuet. var. <i>longiseta</i> Svenson <i>Cyperus malaccensis</i> Lamk. var. <i>brevifolius</i> Boeckl. <i>Cyperus difformis</i> L. <i>Cyperus brevifolius</i> var. <i>leiolepis</i> T.Koyama |
| Lemanaceae | P | <i>Spirodela polyrrhiza</i> Schleid. |
| Eriocaulaceae | A | <i>Eriocaulon cinereum</i> R.Br. |
| Pontederiaceae | A | <i>Monochoria Vaginulis</i> Pr. var. <i>plantaginea</i> Solms-Laub. |
| | P | <i>Eiahornia crassipes</i> Solms-Laub. |
| Juncaceae | P | <i>Juncus effusus</i> L. var. <i>decipiens</i> Buchn. |
| Amaranthaceae | P | <i>Alternanthera sessilis</i> DC. |
| Ranunculaceae | WA | <i>Ranunculus sceleratus</i> L. <i>Ranunculus quelpaertensis</i> Nakai |
| Leguminosae | A | <i>Aeschynomene indica</i> L. |
| Onatraceae | A | <i>Ludwigia eplobioides</i> Maxim. |
| | P | <i>Ludwigia octovalvis</i> ssp. <i>sessiliflora</i> Raven |
| Scrophuoriaceae | WA | <i>Veronica undulata</i> Wall. <i>Veronica peregrina</i> var. <i>xalopensis</i> St. John & Warren |
| Compositae | A | <i>Eclipta prostrata</i> L. <i>Bidens bitrnata</i> Merr. & Scherff. |
| Commelinaceae | A | <i>Commelina communis</i> L. <i>Aneilema keisak</i> Hassk. |
| Parkeriaceae | A | <i>Ceratopteris thalictroides</i> Brongn. |
| Polygonaceae | P | <i>Polygonum glabrum</i> Willd. |
| Lythraceae | A | <i>Rotala indica</i> var. <i>uliginosa</i> Koehne |
| Onagraceae | A | <i>Ludwigia epilobioids</i> Maxim. |
| Rubiaceae | A | <i>Hedyotis diffusa</i> Willd. |

Th (w) (winter annual weed) of 25.5% were the most dominate in form and the remaining 33.3% consisted of Ch (chamaephytes), G (cryptophytes), H (hemicryptophytes) and N (the position of perennating buds:0.3-2m above the surface of the earth). In the radiceoid form, R5 (self-erect forms) of 70.6% occupied the greater part and the remaining 29.4% consisted of R1-R4 (a rootstock plant and a plant forming a clonal line by runners and adventive roots).

Indisseminule form, D4 (Having no special device for scattering and falling under gravity) was 45.1% and D1 (having fine and light fruits or seeds as well as plumes, plumages, alae or the like and carried by wind or water) was 29.4% and the remaining D2-D3 (migrant plants) was 25.5%. Regarding growth form, e (erect forms) was 17.6%, pr (partial rosettes) was 15.7%, b (branched forms) was 13.7% and p (prostrate forms) was 9.8% and the remaining 43.2% was occupied by t (tufted forms), ps (pseudo-rosettes) and r (rosettes).

With respect to the life-form compositions of pineapple field weeds, as regards the dormancy form. H (hemicryptophytes) was 22.0%, Th (annual) and Th (w) (winter annual weed) were respectively 18.8% and G (cryptophytes) was 15.5%. The remaining 40.4% consisted of ch (cryptophytes). N (the position of perennating) buds : 0.3-2m above the surface of the earth) or the like. Regarding the radiceoid form, R5 (self-erect forms) was 53.1% and R1-R4 (a rootstock plant and a plant forming a clonal line by runners and adventive roots) were 46.9%. As regards the disseminule form, D1 (having fine and light fruits or seeds as well as plumes, alae or the like and carried by wind or water) was 40.6% and D4 (having no special device for scattering and falling under gravity) was 34.4% and the remaining D2-D3 (migrant plant) were 25%. Concerning the growth form, e (erect forms) was 34.4%, pr (partial rosettes) was 12.5%, b-2 (branched and liane forms) was 9.4% and the remaining was 41.0%.

With respect to the life-form compositions of paddy field weeds, regarding the dormancy form, HH (hemicryptophytes-hydrophytes) was 39%, HH (Th) (annual hydrophytes) was 29% and Th (w) (winter annual weed) was 7.8%. Regarding the radiceoid form, R5 (self-erect forms) was 60.5% and R2-R4 (a rootstock plant and a plant forming a clonal line by runners and adventive roots) were 39.5%. Concerning the disseminule form, D1, 4 (scattered by wind or water and having no scattering device) was 18.4%. As regards the growth form, t (tufted forms) was 42.1%, e (erect forms) was 18.4%, r (rosettes) was 10.5% ps (pseudorosettes) was 7.8% and the remaining was 21.2%.

As naturalized weeds, 17 families and 78 species were confirmed (Table 5). Though *Paspalum urillei* Steud., *Solanum nigrum* L., *Crassocephalum crepidioides* S. Moore., *Aster subulatus* Michx. and *Bidens pilosa* var. *radiata* Scherff. are relatively new naturalized weeds, they have become injurious weeds of upland fields in this district.

3. Distribution of Weeds

The weeds in sugarcane fields totaled 174 species (the total of frequency was 8 or more in 51 species and 7 or less in 123 species) and the ratio of naturalized weeds was 45.4%. The weeds existing in the pineapple fields consisted of 44 species (the total of frequency was 3 or more in 31 species and 2 or more 12 species) and the ratio of naturalized weeds was 22.7%. The weeds existing in paddy fields totaled 63 species (the total of frequency was 3 or more in 38 species) and the ratio of naturalized weeds was 12.5%.

Table 5. Naturalized weeds

| Family | Growth from | Occurring weed |
|------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Amaranthaceae | A | <i>Amaranthus lividus</i> L. <i>Amaranthus spinosus</i> L. <i>Celosia argentea</i> L. |
| Caryophyllaceae | WA | <i>Cerastium glomeratum</i> Thuill. <i>Arenaria serpyllifolia</i> L. var. <i>tenuior</i> Mert. & Koch <i>Stellaria aquatica</i> Scop. <i>Stellaria alsine</i> Grim. var. <i>undulata</i> Ohwi. |
| Cruciferae | WA | <i>Lepidium virginicum</i> L. <i>Cardamine parviflora</i> L. <i>Capsella bursa-pastoris</i> Medik. <i>Brassica juncea</i> Czern. & Crosson <i>Rorippa indica</i> Hieron. |
| Leguminosae | A | <i>Vicia hirsuta</i> S.F.Gray <i>Cassia lechenaultiana</i> DC. |
| | WA | <i>Medicago lupulina</i> L. <i>Melilotus suaveolens</i> Ledeb. <i>Medicago polymorpha</i> L. <i>Vicia tetrasperma</i> Schreb. <i>Vicia agustifolia</i> L. var. <i>segetalis</i> Koch |
| | P | <i>Desmanthus virgatus</i> Willd. <i>Sebania cannabina</i> Pers. <i>Desmodium canum</i> Schinz & Thellung <i>Desmathus illinoensis</i> MacM. <i>Meidiago sativa</i> L. <i>Mimosa pudica</i> L. <i>Trifolium repens</i> L. |
| Oxalidaceae | P | <i>Oxalis corymbosa</i> DC. |
| Euphorbiaceae | A | <i>Euphorbia vachellii</i> Hook. & Arn. <i>Euphorbia hyssopifolia</i> L. <i>Euphorbia chamesyce</i> L. <i>Euphorbia hirta</i> L. <i>Euphorbia supina</i> Rafin. |
| | WA | <i>Euphorbia helioscopia</i> L. |
| Onagraceae | WA | <i>Oenothera rosea</i> Ait. |
| | P | <i>Oenothera speciosa</i> Nutt. |
| Umbelliferae | A | <i>Apium leptophyllum</i> F.Muell. |
| Labiatae | A | <i>Stachys arvensis</i> L. |
| Solanaceae | A | <i>Solanum alatum</i> Moench. <i>Solanum nigrum</i> L. <i>Physalis angulata</i> L. |
| Sorophulariaceae | A | <i>Veronica peregrina</i> var. <i>xalapensis</i> St. John & Warren |
| Compositae | A | <i>Crassocephalum crepidioides</i> S.Moore <i>Ageratum houstonianum</i> Mill. <i>Ageratum conyzoides</i> L. <i>Bidens pilosa</i> L. <i>Xanthium strumarium</i> L. <i>Bidens pilosa</i> var. <i>minor</i> Scherff. <i>Erectites hieraciifolia</i> Rafin. var. <i>cacalioides</i> Griseb. <i>Sonchus asper</i> J.Hill. <i>Gnaphalium japonicum</i> Thunb. |
| | WA | <i>Aster subulatus</i> Michx. <i>Erigeron canadensis</i> L. <i>Erigeron floridulus</i> Sch.-Bip. |

(cont)

| Family | Growth from | Occurring weed |
|-----------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gramineae | P | <i>Bidens pilosa</i> f. <i>decumbens</i> Scherff. <i>Taraxctum officinale</i> Weber <i>Bidens pilosa</i> var. <i>radiata</i> Scheff. |
| | A | <i>Chloris barbata</i> Sw. <i>Alopecurus aequalis</i> Sobol. var. <i>amurensis</i> Ohwi <i>Rottboellia exaltta</i> L.f. <i>Dactyloctenium aegyptium</i> Richter <i>Cenchrus brownii</i> Roem. & Schult. <i>Setaria verticillata</i> Beauv. |
| | WA | <i>Avena fatua</i> L. <i>Poa annua</i> L. |
| | P | <i>Aorghunhalepens</i> Pers. <i>Chloris gayana</i> Kunth <i>Lolium Perenne</i> L. <i>Paspaulidistum</i> Poir. <i>Brachiaria mutica</i> Stapf <i>Paspalum conjugatum</i> Berg. <i>Coix lacryma-jobi</i> L. <i>Paspalum urvillei</i> Steud. |
| | Sapindaceae | A <i>Cardiospermum</i> L. var. <i>halicacabum microcarpum</i> Bl. |
| | Verdenaceae | P <i>Verbena bonariensis</i> L. <i>Verbea brasiliensis</i> Vell. |
| | Cyperaceae | P <i>Cyperus iria</i> L. |
| | Pontederiaceae | P <i>Eichhornia crassipes</i> Solms-Laub. |

As a result of the investigation on weeds having a high frequency, in sugarcane fields, *Paspalum urvillei* Steud., *Panicum repens* L., *Centella asiatica* Urban., *Cyperus brevifolius* Hassk., *Oxalis corymbosa* DC. and *Artemisia princeps* Pamp. var. *orientalis* Hara, were designated as perennial weeds and *Youngia ponica* DC., *Sonchus oleracous* L., *Gaium spurium* L. var. *echinospermum* Hdyek., *Bothriospermum tenellum* Fich. & May., *Cordamie parviflora* L., *Crassocephalum crepidioides* S. Moore and *Medicago lupulina* L. were designated as winter annual weeds while, as annual weeds, there were *Acalypha australis* L., *Setaria viridis* Beauv., *Amaranthus lividus* L., *Digitaria ciliaris* Koel., *Anagallis arvensis* f. *caerulea* aumg., *Aster subulatus* Michx., *Solanum nigrum* L. or the like.

In pineapple fields, *paspalum urvillei*., Steud., *Paspalum vaginatum* SW., *Paspalum dilatatum* Poir., *Miscanthus sinensis* Afrtd., *Paicum repens* L. and *Alsopila spinuosa* Tryon. were designated as perennial weeds and *Youngia Japonica* DC., *Erigeron floridulus* Sch-Bip., *Crassocephalum crepidioides* S. Moore and *Erechtites hieraciifolia* var. *cacalioides* Gresed. were designated as winter annual weeds and there were *Ageratum houstonianu* Mill., *Ageratum conyzoides* L., *Digitaria ciliaris* Koel., *Eleusine indica* Gaerth., *Arthraxon hispidus* Mak., *Phyllanthus urinaria* L. or the like as annual weeds.

In paddy field, *Scirpus maritimus* L., *Mar-silea quadrifolia* L., *Fimbristylis littoralis* Gaudich., *Scirpus juncoides* var. *hotarui* Ohwi., *Eleocharis acicularis* Roem. and *Potamegeton distinctus* Been. were designated as perennial weeds and there were *Polypogon fugax* Stend., *Alopecurus aequalis* ver. *amurensis* Ohwi. and *Poa annua* L.

Table 6 Arable land weed distribution table of Iriomote Island (1)

| Species | Naturalized weed | Life form | | | | District(Sugarcane field) | | | | Total |
|---------------------------------------------------------------------------|------------------|---------------|---------------|------------------|-------------|---------------------------|--------|--------|------|-------|
| | | Donmancy form | Radicoid form | Disseminule form | Growth form | Toyo hara | Oohara | Ootomi | Komi | |
| 1 <i>Cyperus rotundus</i> L. | | G | R1-2 | D4 | t | 71 | 66 | 50 | 62 | 249 |
| 2 <i>Younia japonica</i> DC. | | Th(w) | R5 | D1 | Ps | 59 | 67 | 70 | 45 | 241 |
| 3 <i>Acalypha australis</i> L. | | Th | R5 | D3 | e | 62 | 33 | 27 | 41 | 163 |
| 4 <i>Setaria viridis</i> Beauv. | | Th | R5 | D4 | t | 32 | 57 | 29 | 44 | 162 |
| 5 <i>Oxalis corniculata</i> L. | | Ch | R4 | D3.2 | p-b | 41 | 48 | 33 | 39 | 161 |
| 6 <i>Amaranthus lividus</i> L. | ◎ | Th | R5 | D4 | e | 59 | 38 | 15 | 22 | 134 |
| 7 <i>Sonchus oleraceus</i> L. | | Th(w) | R5 | D1 | pr | 38 | 51 | 27 | 18 | 134 |
| 8 <i>Galium spuium</i> L. | ◎ | Th(w) | R5 | D2 | b-l | 60 | 17 | 24 | 31 | 132 |
| var. <i>echinospermum</i> Hayek | | | | | | | | | | |
| 9 <i>Digitaria ciliaris</i> Koel. | | Th | R4 | D4 | t-p | 40 | 34 | 29 | 26 | 129 |
| 10 <i>Bothriospermum tenelum</i> Fisch. & Mey. | | Th(w) | R5 | D4 | b-pr | 22 | 36 | 40 | 20 | 118 |
| 11 <i>Anagallis arvensis</i> f. <i>caerulea</i> Baumg. | | Th | R5 | D4 | b | 35 | 43 | 16 | 20 | 114 |
| 12 <i>Aster subulatus</i> Michx. | ◎ | Th | R5 | D1 | e | 19 | 30 | 25 | 16 | 90 |
| 13 <i>Solanum nigrum</i> L. | ◎ | Th | R5 | D2 | b | 19 | 30 | 22 | 16 | 87 |
| 14 <i>Cardamine parviflora</i> L. | ◎ | Th(w) | R5 | D3 | ps | 16 | 33 | 11 | 26 | 86 |
| 15 <i>Paspalum urvillei</i> Steud. | ◎ | H | R5 | D4 | t-p | 20 | 16 | 10 | 14 | 60 |
| 16 <i>Crassocephalum crepidioides</i> S. Moore | ◎ | Th(w) | R5 | D1 | pr | 19 | 20 | 14 | 7 | 60 |
| 17 <i>Medicago lupulia</i> L. | ◎ | Th(w) | R5 | D2 | b | 12 | 6 | 19 | 22 | 59 |
| 18 <i>Panicum repens</i> L. | | H | R2 | D4 | p-e | 23 | 15 | 19 | | 57 |
| 19 <i>Emilia sonchifolia</i> A.DC. | | Th | R5 | D1 | | 16 | 25 | 15 | | 56 |
| 20 <i>Centella asiatica</i> Urban | | ch | R4 | D4 | p | 11 | 30 | 15 | | 56 |
| 21 <i>Erigeron floridulus</i> Sch.-Bip. | ◎ | Th(w) | R5 | D1 | pr | 22 | 10 | 15 | 7 | 54 |
| 22 <i>Sigesbeckia orientalis</i> L. | | Th | R5 | D4 | b-p | | 28 | 24 | | 52 |
| 23 <i>Erechtites hieraciifolia</i> Rafin. var. <i>cacalioides</i> Griseb. | ◎ | Th(w) | R5 | D1 | pr | 14 | 19 | 7 | 11 | 51 |
| 24 <i>Ageratum conyzoides</i> L. | ◎ | Th | R5 | D1 | p | 27 | 19 | | 4 | 50 |
| 25 <i>Lactuca indica</i> L. | | Th(w) | R5 | D1 | pr | 16 | 4 | 13 | 16 | 49 |
| 26 <i>Cyperus brevifolius</i> Hassk. | | H | R3 | D4 | ps | | 9 | 22 | 16 | 47 |
| 27 <i>Oxalis corymbosa</i> DC. | ◎ | G | R5(b) | D5 | r | 6 | 20 | 11 | 9 | 46 |
| 28 <i>Paspalum orbiculare</i> G Forst. | | H | R5 | D4 | t-p | | 11 | 13 | 14 | 38 |
| 29 <i>Portulaca oleracea</i> L. | | Th | R5 | D4 | b | 9 | 15 | | 14 | 38 |
| 30 <i>Artemisia princeps</i> pamp. var. <i>orientalis</i> Hara | | ch | R2-3 | D4 | pr | 22 | | | 15 | 37 |
| 31 <i>Arenaria serpyllifolia</i> L. var. <i>tenuior</i> Mert. & Koch | ◎ | Th(w) | R5 | D4 | b | 10 | 15 | | 11 | 36 |
| 32 <i>Ageratum houstonianum</i> Mill. | ◎ | Th | R5 | D1 | b-pr | 20 | 15 | | | 35 |
| 33 <i>Commelina diffusa</i> Burm.f. | | Th | R5 | D4 | b-p | 7 | 23 | 4 | | 34 |
| 34 <i>Allium macrostemon</i> Bunge | | G | R3(b) | D4 | r | 15 | 11 | 8 | | 34 |
| 35 <i>Eleusine indica</i> Gaertn. | | Th | R5 | D4 | t | 6 | 17 | 10 | | 33 |
| 36 <i>Euphorbia chamaesyce</i> L. | ◎ | Th | R5 | D3 | b | | 10 | | 21 | 31 |
| 37 <i>Apium leptophyllum</i> F.Muell. | ◎ | Th | R2 | D4 | p | 16 | | 14 | | 30 |
| 38 <i>Bidens pilosa</i> var. <i>radiata</i> Scherff. | ◎ | N | R5 | D2 | e | 5 | 14 | 2 | 6 | 27 |
| 39 <i>Phyllanthus urinaria</i> L. | | Th | R5 | D3 | e | 12 | | | 12 | 24 |
| 40 <i>Sonchus asper</i> J.Hill. | ◎ | Th(w) | R5 | D1 | pr | 12 | | 9 | | 21 |
| 41 <i>Hemistepta lyrata</i> Bunge | | Th(w) | R5 | D1 | pr | | | 12 | 9 | 21 |
| 42 <i>Gnaphalium japonicum</i> Thunb. | ◎ | ch | R5 | D1 | ps-b | 6 | 9 | | 5 | 20 |
| 43 <i>Polygonum chinense</i> L. | | H | R4 | D4 | p | 7 | 12 | | | 19 |
| 44 <i>Paspalum conjugatum</i> Berg. | ◎ | ch | R2 | D4 | p | | | 13 | 4 | 17 |
| 45 <i>Dactyloctenium aegyptium</i> Rucgter | ◎ | Th | R4 | D2 | p-e | 5 | 11 | | | 16 |
| 46 <i>Amaranthus spinosus</i> L. | ◎ | Th | R5 | D4 | e | 6 | 10 | | | 16 |

(cont)

| Species | Naturalized weed | Life form | | | | District (Sugarcane field) | | | | Total |
|--------------------------------------------------------------------|------------------|---------------|---------------|------------------|-------------|----------------------------|--------|--------|------|-------|
| | | Donmancy form | Radicoid form | Disseminule form | Growth form | Toyo hara | Oohara | Ootomi | Komi | |
| 47 <i>Verbena officinalis</i> L. | | H | R3 | D4 | e | | | 4 | 11 | 15 |
| 48 <i>Euphorbia hirta</i> L. | ◎ | Th | R5 | D3 | b | 6 | 9 | | | 15 |
| 49 <i>Imperata cylindrica</i> Beauv. var. <i>major</i> C.E.Hubb | | G | R1-2 | D1 | e | 8 | 5 | | | 13 |
| 50 <i>Eclipta prostrata</i> L. | | Th | R5 | D1.4 | e | | 3 | 7 | | 10 |
| 51 <i>Gnaphalium luteo-album</i> ssp. <i>affine</i> Koster | | ch | R5 | D1 | ps-b | 6 | 2 | | | 8 |

Weed of level 6 in: ◎*Stellaria aquatica* Scop. ◎*Vicia hicia hirsuta* S.F.Gray.

total of frequency *Veronica didyma* Tenore *Plantago asiatica* L.

Digitaria violascens Link. *Commelina bengalensis* L.

◎*Physalis angulata* L. *Mentha arvensis* L. var. *piperascens* Malinv.

oehmeria nivea f. *nipponivea* Hjatrsima. ◎*Euphorbia supina* Rafin.

◎*Bidens pilosa* f. *decumbens* Scherff.

◎*Bidens pilosa* var. *radiata* Scherff. ◎*Bidens pilosa* L.

Weed of level 5 in: ◎*Stellaria alsine* Grimm. var. *undulata* Ohwi.

total of frequency ◎*Capsella bursa-pastoris* Medik. ◎*Cardamine parviflora* L.

Sedum bulbiferum Mak. *Miscanthus sinensis* Anders.

◎*Mimosa pudica* L. ◎*Vicia angustifolia* L. var. *segetalis* Koch.

◎*Vicia tetraspera* Schreb. ◎*Rottboelia exaltata* L.f.

Viola confusa Champ. *Cyperus cyperoides* O.K.

Mazus pumilus v. Steenis

Leptochloa panicea Ohwi *Setaria glauca* Beauv.

Setaria pallide-fusca Stapf & Hubb.

◎*Erigeron canadensis* L.

Weed of level 4 in: ◎*Setaria verticillata* Beauv. *Ergrostis multicaulis* Steud.

total of frequency *Lolium multiflorum* Lamk. *Sporobolus fertilis* W.D.Clayton

◎*Avena fatua* L. *Pinellia ternata* Ten. *Puzosia zeylanica* Benn.

Polygonum hydropiper L. ◎*Euphorbia vachellii* Hook. & Arn.

Polygonum longisetum de Bruyn. *Lindernia crustacea* F.v.Muell.

Clematis graa Wall. var. *ryukyuensis* Tamura

Trifolium pratense L. ◎*Bidens pilosa* L.

Eriocloa procera C.E.Hubb. ◎*Erigeron canadensis* L.

◎*Taraxacum officinale* Weber *Ipomoea acuminata* Roem. & Schult.

◎*Cenchrus brownii* Roem. & Schult. ◎*Poa annua* L.

Weed of level 3 in: *Achyranthes aspera* var. *rubrofusca* Hook.f.

total of frequency *Corydalis heterocarpa* var. *japonica* Ohwi

◎*Cardiospermum ialicacabum* L. var. *microcarpum* Bl.

Ranunculus sieboldii Miq. *Gonostegia hira* Miq.

Veronica javana Bl. *Lysimachia mauritiana* Lamk.

◎*Boehmeria nivea* var. *nipponivea* Htusima.

Ajuga taiwanensis Nak. *Sporocolus fertilis* W.S.Clayton.

Weed of level 2 in: ◎*Amaranthus retroflexus* L. ◎*Celosia asperata* L.

total of frequency *Talinum paniculatum* Gaetrn. *Saginia japonica* Ohwi.

◎*Cerastium ilomertum* Thuill. ◎*Brasica guncea* Czern. & Crosson.

Brassica sapa var. *nippooleifera* Kitam.

◎*Rorippa indica* Hereon. *Rorippa dubia* Hara.

◎*Melilotus suaveolens* Ledeb. ◎*Kalanchoe pinnatifida* Pers.

Crotalaria asamica Benth.

Oerlla frutescens var. *acutuca* Kubo.

©*Sebania cannabina* Pers. ©*Chloris gayana* Kunth.

Weed of level 1 in: *Crotalaria bialata* Schrank *Cassia mimosides* var. *nomme* Mak.

total of frequency ©*Trifolium repens* L. ©*Desmanthus virgatus* Willd.

©*Desmanthus illinoensis* MacM. ©*Oenothera speciosa* Nutt.

©*Veronica peregrina* var. *xalopensis* St. John & Warren.

©*Xanthium strumarium* L. *Blumea lacera* DC.

Adenostemma lavenia O.K. *Ixeris lanceolata* Steff.

©*Chloris barbata* Sw. ©*Sorghum halepense* Pers.

Ischaemum aristatum L. *Digitaria henryi* Rendle

©*Oenothera rosea* Ait. ©*Verbena brasiliensis* Vell.

©*Verbena bonariensis* L. ©*Erigeron annuus* L.

Kalimeris indica Sch.-Bip. *Artemisia capillaris* Thunb.

Lindernia anagallis Pennell.

Ampelopsis brevipedunculata var. *hancei* Rehd.

Androsace umbellata Merr. *Chenopodium virgatum* Thunb.

Typhonium divaricatum Decne. *Vernonia cierea* Less.

©*Casa lechenaultiana* DC. *Euphorbia thymifolia* L.

©*Euphorbia hyssopifolia* L. ©*Medicago sativa* L.

©*Desmodium canum* Schinz & Thellung ©*Stachys arvensis* L.

©*Lolium perenne* L. ©*Coix lacryma-jobi* L.

Notes) 1. Numeral shows dominance (C+F/2)

2. ©: Naturalized weed

3. Th : annual weed (w: biennial weed). Ch: chamaephytes. H: hemicryptophytes. G: ctyptophytes.

N : microphanerophytes. HH(Th): annual hydrophytes, HH: perennial hydrophytes.

R1 : rootstock traverses to form connect body within widest range.

R2 : rootstock traverses to form connect body within slightly wide range.

R3 : rootstock is branched shortly to form connect body within narrowest range.

R4 : runner extends to surface of earth or droops and takes root here and there to form connect body.

R5 : one erected individually without forming connect body above and under ground.

R1-2 R2-3 : one having width within the range of underground connect body.

R5(b) : one having tuber and breeding by adventive roots.

D1 : wind or water scattering. D2: adhesion to animal or human body. D3: automatic scattering.

D4 : one having no scattering device. D5: vegetative propagation.

D1.4 D2.4 : one having scattering types of both D1 and D4 or D2 and D4.

e : erect forms. b : branched forms. t : tufted growth. r : rosettes. pr: partial rosettes.

bp : branched and prostrate forms. pe : prostrate and erect forms.

t-p : tufted growth and prostrate forms.

Table 6 Arable land weed distribution table of Iriomote Island (2)

| Species | Naturalized weed | Life form | | | | District(Pineapple field) | | | total |
|------------------------------------------------------------------------------|------------------|---------------|---------------|------------------|-------------|---------------------------|-------------|-------------|-------|
| | | Dormancy form | Radicoid form | Disseminule form | Growth form | Uehara | Funaura (1) | Funaura (2) | |
| 1 <i>Ageratum houstonianum</i> Mill | ◎ | Th | R5 | D1 | b-pr | 29 | 22 | 35 | 86 |
| 2 <i>Paspalum urvillei</i> Steud. | ◎ | H | R5 | D4 | t-p | 14 | 30 | 26 | 70 |
| 3 <i>Youngia japonica</i> DC. | | Th(w) | R5 | D1 | ps | 40 | 20 | 4 | 64 |
| 4 <i>Erigeron florduus</i> Sch.-Bip. | ◎ | Th(w) | R5 | D1 | pr | 14 | 27 | 21 | 62 |
| 5 <i>Paspalum conjugatum</i> Berg. | ◎ | ch | R2 | D4 | p | 14 | 22 | 17 | 53 |
| 6 <i>Paspalum dilatatum</i> Poir | ◎ | H | R3 | D4 | t | 20 | 13 | 19 | 52 |
| 7 <i>Ageratum conyzoides</i> L. | ◎ | Th | R5 | D1 | b-pr | 21 | 17 | 14 | 52 |
| 8 <i>Crassocephalum crepidioides</i> S.Moore | ◎ | Th(w) | R5 | D1 | pr | 25 | 19 | 7 | 51 |
| 9 <i>Digitaria ciliaris</i> Koel, | | Th | R4 | D4 | t-p | 22 | 15 | 10 | 47 |
| 10 <i>Pteridil aequilinum</i> Kuhn var. <i>l. Ziusculum</i> Underw. | | G | R1-2 | D1 | e | 5 | 16 | 23 | 44 |
| 11 <i>Miscanthus sinensis</i> Anders. | | H | R3 | D1 | t | 16 | 17 | 10 | 43 |
| 12 <i>Oxalis corniculata</i> L. | | ch | R4 | D3.2 | p-b | 6 | 12 | 15 | 33 |
| 13 <i>Erechtites hieraciifolia</i> Rafin. var. <i>cacalioides</i> Griseb. | ◎ | Th(w) | R5 | D1 | pr | 4 | 16 | 11 | 31 |
| 14 <i>Panicum rypens</i> L. | | H | R2 | D4 | p-e | 18 | 10 | 2 | 30 |
| 15 <i>Alsophila spinuosa</i> Tryon | | M | R5 | D4 | e | 7 | 6 | 15 | 28 |
| 16 <i>Dicranopteris dichotoma</i> Bernh. | | GR2-3 | D1 | e | | 4 | 18 | 22 | |
| 17 <i>Oxalialoymyosa</i> DC. | ◎ | G | R5(b) | D5 | r | 10 | 4 | 7 | 21 |
| 18 <i>Thelypeters acuminata</i> Morton | | R2-3 | D1 | e | 5 | 2 | 13 | 20 | |
| 19 <i>Impeata cylindrica</i> Beauv. var. <i>major</i> C.E.Hubb. | | G | R1-2 | D1 | e | 16 | | 3 | 19 |
| 20 <i>Melastoma candidum</i> D.Don | | N | R5 | D4 | e | 9 | 6 | | 15 |
| 21 <i>Cyperus brevifolius</i> var. <i>leirolepis</i> T.Koyama | | H | R3 | D1.4 | t,e | 4 | 8 | 3 | 15 |
| 22 <i>Sphenomeris hhinensis</i> Maxon | | H | R5 | D4 | e | 2 | | 12 | 14 |
| 23 <i>Lygodium japonicum</i> Sw. | | G | R5 | D3 | e | 2 | 7 | | 9 |
| 24 <i>Boehmeria nivea</i> f. <i>viridua</i> Hatusima | | ch | R3 | D4 | e | 6 | 1 | | 7 |
| 25 <i>Rubus rosaeifolius</i> ssp. <i>maximoWiczii</i> Focke | | N | R5 | D2 | b-l | | 4 | 1 | 5 |
| 26 <i>Eleusine indica</i> Gaertn. | | Th | R5 | D4 | t | | 2 | 2 | 4 |
| 27 <i>Arthraxon hispidus</i> Mak. | | Th | R4 | D4 | b-p | 4 | | | 4 |
| 28 <i>Phyllanthus urinaria</i> L. | | Th | R5 | D3 | e | 4 | | | 4 |
| 29 <i>Nephrolepis atriculata</i> Trimen | | H | R2-3 | D1 | e | 3 | 1 | | 4 |
| 30 <i>Rubusieboldii</i> Bl. | | N | R5 | D2 | b-l | | 2 | 2 | 4 |
| 31 <i>Galium spurium</i> L. var. <i>echiospermum</i> Hayek | ◎ | Th(w) | R5 | D2 | b-l | | 2 | 2 | 4 |
| 32 <i>Lactuca idica</i> L. | | Th(w) | R5 | D1 | pr | | 3 | | 3 |

Weed of level 2 in: *Indigofera hendecaphylla* Jacq. *Polygonum chinense* L.
total of frequency *Pueraria montana* Merr. *Lespedeza cuneata* G,Don.
Ampelopsis brevipedunculata var. *hancei* Rehd.
Paederia scandens Merr.

weed of level 1 in: *Macaranga tanarius* Muell.-Arg. *Hibiscus mutabilis* L.
total of frequency *Ficus erecta* Thunb, *Oplismenus compositus* Beauv.
Morus australis Poir. *Abelmoschus moschatus* Medik.

Table 6 Arable land weed distribution table of Iriomote Island (3)

| Species | Naturalized form | Life form | | | | District(Paddy field) | | | Total |
|---------------------------------------------------------------------------------|------------------|---------------|---------------|------------------|-------------|-----------------------|------------|------|-------|
| | | Dormancy form | Radicoid form | Disseminule form | Growth form | Urauchi | Oohara (2) | Komi | |
| 1 <i>Scirpus maritims</i> L. | | HH | R2-3(t) | D1,4 | e, t | 56 | 40 | 50 | 146 |
| 2 <i>Marsilea quadrifolia</i> L. | | HH | R2-3 | D1 | e | 34 | 45 | 36 | 115 |
| 3 <i>Fimbristylis littoralis</i> Gaudich | | HH | R5 | D1,4 | t | 42 | 33 | 27 | 102 |
| 4 <i>Scirpus juncoides</i> var. <i>hotarui</i> Ohwi | | HH | R5 | D1,4 | t | 37 | 41 | 22 | 100 |
| 5 <i>Eleocharis acicularis</i> Roem. & Schuet. var. <i>longiseta</i> Svenson | | HH | R3 | D1,4 | t | 40 | 21 | 35 | 96 |
| 6 <i>Spirodela polyrrhiza</i> Schleid. | | HH(Th) | R5 | D1 | n, r | 22 | 29 | 34 | 85 |
| 7 <i>Cyperus globosus</i> All. | | ThH | R5 | D1,4 | t | 17 | 39 | 27 | 83 |
| 8 <i>Monochoria vaginalis</i> Pr. var. <i>plantaginea</i> Solms-Laub. | | HH(Th) | R5 | D1,4 | ps | 11 | 42 | 26 | 79 |
| 9 <i>Potamogeton distinctus</i> Benn. | | HH | R2-3 | D1 | r | 30 | 25 | 19 | 74 |
| 10 <i>Echinochloa crus-galli</i> var. <i>caudata</i> Kitagawa | | HH(Th) | R5 | D4 | t-p | 26 | 10 | 37 | 73 |
| 11 <i>Cyperus difformis</i> L. | | HH(Th) | R5 | D1,4 | t | 25 | 12 | 36 | 73 |
| 12 <i>Cyperus iria</i> L. | ◎ | Th | R5 | D4 | t | 16 | 25 | 31 | 72 |
| 13 <i>Sagittaria pygmaea</i> Mip. | | HH | R3(t) | D1 | r | 12 | 31 | 25 | 68 |
| 14 <i>Sagittaria trifolia</i> L. | | HH | R3(t) | D1 | r | 31 | 20 | 17 | 68 |
| 15 <i>Polygonum fugax</i> Steud. | | Th(w) | R5 | D1,4 | t | 5 | 19 | 29 | 53 |
| 16 <i>Cyperus serotinus</i> Rottb. | | HH | R3(t) | D1,4 | t | 34 | 5 | 11 | 50 |
| 17 <i>Echinochloa crus-galli</i> var. <i>praticola</i> Ohwi | | Th | R5 | D4 | t-p | 14 | 22 | 10 | 46 |
| 18 <i>Cyperus tenuispicus</i> Steud. | | HH(Th) | R5 | D1,4 | t | 4 | 16 | 25 | 45 |
| 19 <i>Cyperus polystachyos</i> Rottb. | | Th | R5 | D4 | t | 20 | 10 | 13 | 43 |
| 20 <i>Blyxa echinosperma</i> Hook.f. | | HH(Th) | R5 | D1 | r | 10 | 20 | 7 | 37 |
| 21 <i>Limnophila sessiliflora</i> Bl. | | HH | R3 | D4 | e | 7 | 12 | | 19 |
| 22 <i>Eclipta prostrata</i> L. | | Th | R5 | D1,4 | e | 14 | 4 | | 18 |
| 23 <i>Lindernia procumbens</i> philcox | | HH(Th) | R5 | D1,4 | b-p | | | 16 | 16 |
| 24 <i>Echinochloa crus-galli</i> P.Beauv. var. <i>pryzicola</i> Ohwi | | Th | R5 | D1,4 | t-p | 12 | | 4 | 16 |
| 25 <i>Aneilema keisak</i> Hassk. | | HH(Th) | R4 | D1,4 | b-p | | 9 | 6 | 15 |
| 26 <i>Ludwigia epilobioides</i> Maxim. | | HH(Th) | R5 | D1,4 | e | 5 | 10 | | 15 |
| 27 <i>Cyperus odoratus</i> L. | | HH | R4 | D1,4 | t | 8 | | 6 | 14 |
| 28 <i>Cyperus compressus</i> L. | | Th | R5 | D4 | t | 5 | | 5 | 10 |
| 29 <i>Cyperus halpan</i> L. | | HH | R3 | D1,4 | e | 9 | | | 9 |
| 30 <i>Eleocharis kuroguwai</i> Ohwi | | HH | R2-3(t) | D1,4 | t | | 7 | 1 | 8 |
| 31 <i>Alopecurus aequalis</i> Sobol. var. <i>amurensis</i> Ohwi | ◎ | Th(w) | R5 | D1,4 | t | 6 | 2 | | 8 |
| 32 <i>Ranunculus sceleratus</i> L. | | HH(Th) | R5 | D1,4 | ps | 4 | 3 | | 7 |
| 33 <i>Isachne globosa</i> O.K. | | N | R2-3 | D1,4 | t-p | 2 | 5 | | 7 |
| 34 <i>Veronica undulata</i> Wall. | | HH(Thw) | R5 | D1,4 | e | 3 | 2 | | 5 |
| 35 <i>Scirpus triqueter</i> L. | | HH | R2-3 | D1,4 | e | 4 | 1 | | 5 |
| 36 <i>Poa annua</i> L. | ◎ | Th(w) | R5 | D4 | t | 2 | 2 | | 4 |
| 37 <i>Fimbristylis dichotoma</i> f. <i>annua</i> Ohwi | | HH(Th) | R5 | D1,4 | t | 4 | | | 4 |
| 38 <i>Ficthornia crassipes</i> Solms-Laub. | ◎ | HH | R4 | D1 | ps | 1 | 2 | | 3 |

Weed of level 2 in: *Scirpus mucronatus* L. ssp. *robustus* T. Koyama. *Cyperus pilosus* Vahl.
total of frequency *Cyprus alternifolius* L. var. *obtusangulus* L. T. Koyama.

Ludwigia octovalvis ssp. *sessiliflora* Raven.

Polypogon monospeliensis Desf. *Alternanthera sessilis* DC.

Eriocaulon cinereum R.Br. *Hydrilla verticillata* Royle.

Ischaemum rugosum Salisb. var. *segetum* Hack.

◎*Brachiaria subquadripata* Hitch. *Brachiaria mutica* Stapf.

Arundo donax L. *Cyperus brevifolius* var. *leiolepis* T. Koyama.

Scirpus ternatanus Reinw. *Ceratopteris halictroies* Brongn.

Ottelia alismoides pers. *Commelina communis* L.

Marsilea crenata Presl.

Weed of level 1 in: ◎*Veronica peregrina* var. *xalopensis* St. John & Warren.

total of frequency: *Polygonum glabrum* Willd. *Typna domingensis* Pers.

Cybert malaccensis Lamk. var. *brevifolius* Boeckl.

Aeschynomene indica L.

◎*Bidens biternata* Merr. & Scherff.

◎*Cenchrus brownii* Roem. & Schult.

as winter annual weeds, and *Spirodela polyrrhiza* Schleid., *Echinochloa causs-galli* var. *caudata* Kitagawa, *Cyperus difformis* L., *Cyperus iria* L., *Echinochloa* var. *praticola* Ohwi., *Cyperus polystachyous* Rottb. or the like were many as annual weeds. Naturalized weeds consisted of 17 families and 78 species among the total occurring number of 305 species with a ration of 25.5%.

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西表島の農耕地雑草と帰化植物の分布ならびに発生の様相

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摘 要

西表島東部と西部の雑草の実態を把握するために農耕地雑草、及び帰化植物の種類、発生量及び分布を調べた。

1. 耕地雑草では、サトウキビ畑雑草27科131種、パイナップル畑雑草20科46種、サトウキビ畑・パイナップル畑共通雑草22科59種、水田雑草25科69種が確認できた。
2. 帰化植物は17科78種、全草種では56科305種が確認できた。
3. 雑草分布調査では、サトウキビ畑で出現した種数は174種であり、45.7%が帰化植物であった。パイナップル畑においては44種のうち、22.7%、水田においては63種のうち、12.6%が帰化植物であった。
4. 作物畑別に雑草の分布を見ると、サトウキビ畑ではマメ科、イネ科、キク科が多く、パイナップル畑ではイネ科、キク科、水田ではカヤツリグサ科、イネ科が多かった。
5. サトウキビ畑の生活型組成は、TH-R_s-D₁-e、パイナップル畑においてはH-R_f-D_f-e、水田においては、HH-R_f-D_f-tが最も多かった。
6. 地域的には雑草の組成にあまり差はみられなかったが、概して大原、豊原地域にはタツノツメガヤ、ハリビューが多かった。
7. 比較的新しい帰化植物で、現に盛んに繁殖しているもの、または将来繁殖地が著しく拡大するおそれのある雑草はタチスズメノヒエとタチアワユキセンダングサである。

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