Bothalia 14, 3 & 4: 971–975 (1983)

The weeds of abandoned cotton fields in Mozambique

A. A. BALSINHAS*

ABSTRACT

Based on a botanical survey of Chibuto, Chemba, Namapa, Nampula and Mutuali, a table of 120 of the most common weeds of cotton and fallow fields in Mozambique is presented. After considering the factors which affect the flora of these zones, the successional weed vegetation is described and the principal species are enumerated. Finally, the dangers of infestation (shrubby weeds in alluvial zones) and the utilization of the weed flora in other zones of the country are described.

RÉSUMÉ

LES MAUVAISES HERBES DES CHAMPS DE COTON ABANDONNÉS AU MOZAMBIQUE

Basé sur une prospection botanique des zones de Chibuto, Chemba, Namapa, Nampula et Mutuali, un tableau de 120 mauvaises herbes parmi les plus communes trouvées dans les champs de coton et les jachères au Mozambique, est présenté. Après quelques considérations sur les facteurs qui conditionnent la flore de ces zones, les aspects de la succession de la végétation des mauvaises herbes sont décrit et les principales espèces sont énumérées. Il est fait mention des dangers d'infestation (mauvaises herbes arbustives dans les zones d'alluvions) et de l'utilisation de la flore des mauvaises herbes dans d'autres zones du pays.

PLANTAS INFESTANTES DOS CAMPOS DE ALGODAO DE MOCAMBIQUE

Baseado em reconhecimentos botanicos a zonas do Chibuto, Chemba, Namapa, Nampula e Mutuali, o autor apresenta um quadro com 120 das mais comuns infestantes de pousios e campos de algodão de Mocambique. Faz depois consideraçoes acerca dos factores que condicionam a flora dessas zonas, descreve aspectos da sua sucessao e enumera os seus principais componentes; nas conclusoes refere-se aos perigos que podem advir da infestacao arbustiva nas zonas aluvionares e á utilidade da flora infestante em outras zonas do país.

OBSERVATIONS

The cultivation of cotton has had an important influence on economic development in the central and northern regions of Mozambique. The control of weeds in cotton fields in these regions has been a major problem for many years. Enforcement of control measures was responsible for socio/political trouble during the late 1940's and early 1950's.

In 1960 a survey was made of the weed vegetation of cotton and fallow fields (Lemos, 1961; Balsinhas, 1962). In this survey a large number of herbarium specimens was collected, and duplicates were sent to the herbaria COI, LISC, KEW, SRGH and PRE. Field notes including common and local names were recorded.

The present author then published the first check list of plants growing in cotton and fallow fields in Mozambique (Balsinhas, 1963). Research work and experimentation on herbicides was initiated in the same year (Almeida, 1970).

However, this is a vast subject and as Mozambique is traditionally an agricultural country it is essential that knowledge of the weed flora is improved. This is the motive for a further contribution to the subject using the existing information in the National Herbarium, Pretoria.

The notes on geographical distribution in Table 1 were compiled from the Flora Zambesiaca, Flora Tropical East Africa and Flora West Tropical Africa.

Analysis of the distribution of the species in the study areas (see Table 1) shows a difference in botanical composition indicating two distinct weed floras on distinct ecological sites. Weeds marked with an asterisk are abundant.

1. In the Chibuto and Chemba study areas on the flood plains of the Limpopo and Zambezi Rivers, there is a pantropical weed flora. Its distribution is influenced by edaphic factors as well as by the intensive cultivation of diverse food crops to supply the considerable human population. Here the major weeds are: *Abutilon grandiflorum, Acalypha segetalis**, *Amaranthus spinosus, Boerhavia diffusa**, *Brachiaria eruciformis**, *Cardiospermum halicacabum* var. *halicacabum, Chenopodium album, Cyperus rotundus**, *Hybanthus enneaspermus* var. *enneaspermus, Ipomoea sinensis* subsp. *blepharosepala**, *Leptochloa panicea**, *Portulaca oleracea, Zaleya pentandra**, etc. They are commonest in open places, in woodland, riversides, irrigated land, waste places and cultivated ground.

2. In the Nyassan sub-littoral and subplanaltic study areas, at Namapa and Mampula, and the south-central study area at Mutuali there is an abundant indigenous ruderal weed flora. Its composition and distribution is largely influenced by climatic factors and the cotton monoculture. The principal weeds are as follows: *Aspilia kotschyi* var. *kotschyi, Aspilia schimperi, Chrysanthellum americanum, Digitaria milanjensis, Digitaria setivalva**, *Eragrostis cylindriflora**, *Indigofera colutea* var.

* Botanical Research Institute, Department of Agriculture, Private Bag X101, Pretoria 0001, South Africa.

colutea, Indigofera demissa, Mucuna coriacea, Oldenlandia caespitosa* var. *subpedunculata, Pennisetum polystachion, Rhynchelytrum repens*, Sonchus bipontinii, Tricliceras longepedunculata* var. *eratense, Tridax procumbens*, Vernonia ambigua,* etc. They occur in open woodland, grasslands, often in fallow fields or on old cultivation sites.

The weed flora of fields consists mainly of annual or herbaceous perennial plants. Manual weed control before the cotton is picked, eliminates most shrubby weeds. These become a problem in fallow fields only three or four years after cultivation has ceased. The more important shrubby species are: *Acacia polyacantha* subsp. *campylacantha*, Cassia petersiana, Commiphora edulis, Cryptolepis obtusa*, Markhamia obtusifolia*, Monotes africanus** and *Tabernaemontana elegans.*

The succession of the weed vegetation in fields left fallow or when cultivation has ceased for about three years or more, is as follows:

1. Chibuto. Grasslands of *Brachiaria eruciformis, Hyparrhenia rufa* var. *rufa, Hyperthelis dissoluta, Leptochloa panicea, Sorghum verticilliflorum,* etc., with *Abutilon grandiflorum, Cardiospermum halicacabum* var. *halicacabum, Hibiscus vitifolius* subsp. *vulgaris, Ipomoea sinensis* subsp. *blepharosepala, Oxalis semiloba* subsp. *semiloba,* etc., Thorny shrub invasion of *Acacia nilotica* subsp. *kraussiana,* and sometimes *Acacia tortilis* subsp. *heteracantha,* etc.

2. Chemba. Grasslands of *Dactyloctenium giganteum, Digitaria milanjiana, Hyparrhenia rufa* var. *rufa, Panicum maximum, Pseudobrachiaria deflexa, Urochloa mosambicensis,* etc., with *Abutilon grandiflorum, Aerva tomentosa, Hermannia kirkii, Hibiscus caesius.* Cucurbitaceae include: *Ctenolepis cerasiformis, Cucumis anguria* and *Momordica kirkii; Sesbania mosambicensis* var. *mosambicensis, Vernonia kirkii,* etc. There is not much shrubby infestation except colonies of *Commiphora edulis.*

3. Namapa. Grasslands of *Aristida adscensionis, Eragrostis cylindrica, Hyparrhenia dichroa, Hyparrhenia filipendula* var. *filipendula, Panicum maximum, Pennisetum polystachion, Rottboellia exaltata.* In poorly drained soils, *Urochloa mosambicensis,* occurs, with *Aspilia kotschyi* var. *kotschyi, Sonchus bipontinii, Crotalaria virgulata, Mucuna coriacea, Tricliceras longepedunculata* var. *eratense,* etc. Shrubby invaders are *Acacia polyacantha* subsp. *campylacantha, Markhamia obtusifolia, Cassia petersiana,* etc.

4. Nampula. Grasslands of *Digitaria perrottetii, Digitaria setivalva, Eragrostis aethiopica, Eragrostis cylindrica, Hyparrhenia filipendula* var. *filipendula, Hyperthelis dissoluta, Panicum maximum, Pennisetum polystachion, Rhynchelytrum repens,* etc., with *Acalypha ciliata, Aspilia kotschyi* var. *kotschyi, Crotalaria virgulata, Indigofera colutea* var. *colutea, Mucuna coriacea, Sonchus bipontinii.* Shrubby invaders are *Markhamia obtusifolia* and *Tabernaemontana elegans.*

5. Mutuali. Grasslands of *Aristida adscensionis, Digitaria ciliaris, Eragrostis aspera, Eragrostis cylindriflora, Hyparrhenia rufa* var. *rufa, Hyparrhenia filipendula* var. *filipendula, Hyparrhenia variabilis, Leptocarydion vulpiastrum, Pennisetum polystachion, Rhynchelytrum repens,* etc., *Aspilia kotschyi* var. *kotschyi, Bidens schimperi, Chrysanthellum americanum, Indigofera demissa, Ocimum canum, Oldenlandia caespitosa* var. *subpedunculata.* The only shrubby invader seen was *Monotes africanus.*

CONCLUSIONS

As shown in Table 1, *Tribulus terrestris* and *Vernonia glabra* occur in all the study areas. The former species is largely disseminated, as a weed, in tropical and temperate regions throughout the world and the second is widespread only in tropical Africa. *Boerhavia diffusa, Corchorus tridens, Ocimum canum* and *Striga asiatica* are common tropical weeds and occur in four of the zones. The weeds that occur in one, two or three zones only, are more restricted to the environmental conditions described in the text.

If the fields in the alluvial zones are left fallow too long or without crop rotation, there is a danger that thorny thickets will develop which will rarely succeed to open grassy savanna. Once thickets develop the recurrent use of chemical products, to keep large areas of land clear, is both difficult and expensive.

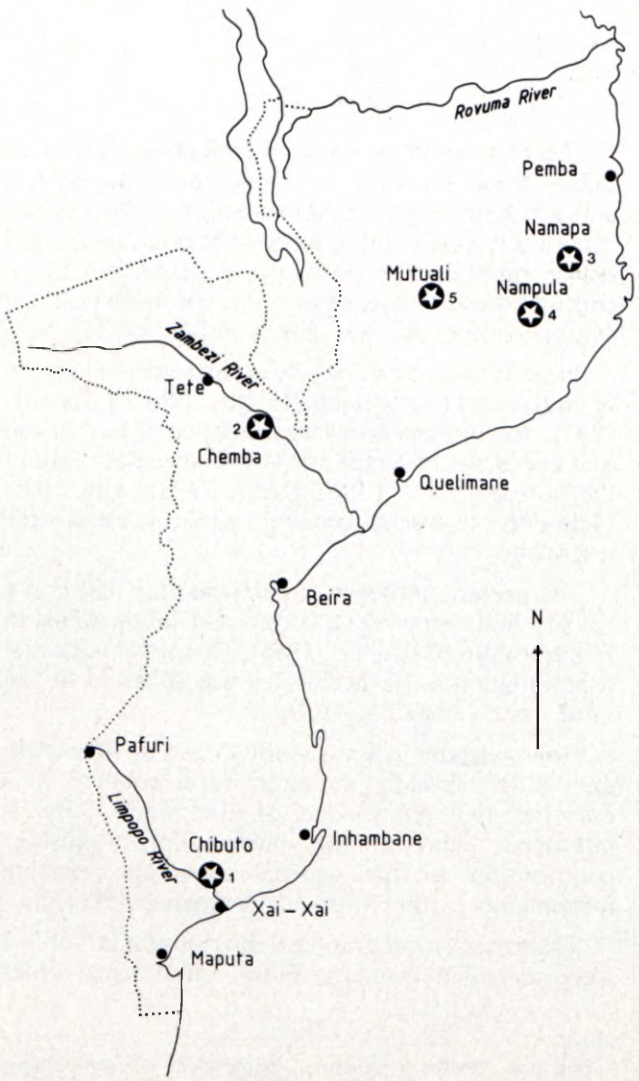

FIG. 1.—The positions of the areas studied in Mozambique.

TABLE 1. – The occurrence of weed species in five study areas in Mozambique (see Fig. 1) 973–974

Botanical name	Study areas* 1	2	3	4	5	Geographical distribution
Abutilon grandiflorum G. Don	+	+				Also in S. Tomé, Angola, Transvaal, Zululand and Madagascar
Acacia polyacantha Willd. subsp. *campylacantha* (Hochst. ex A. Rich.) Brenan			+			Widespread in tropical Africa from Gambia and Ethiopia (Eritrea) to Transvaal
Acalypha ciliata Forsk.				+		A widely spread weed in tropical Africa, Arabia and India
Acalypha indica L.		+				Through tropical Africa and Asia
Acalypha segetalis Muell. Arg.	+					Widespread in Tropica Africa
Acanthospermum hispidum DC.				+	+	Native of tropical America and now widely spread
Aerva tomentosa Forsk.		+				Extends from Mauritania through Africa to Arabia and India. Absent from Java
Amaranthus spinosus L.	+					Native of tropical America now widespread in warm countries
Argemone mexicana L.	+					Native of Central and tropical S. America. Widespread in all warm regions
Aristida adscensionis L.		+	+		+	Widely distributed in the warm and hot regions of the Old and New Worlds
Aspilia kotschyi (Schultz Bip.) Oliv. var. *kotschyi*			+	+	+	Extends from Sudan through East Africa to Angola. Also in Zanzibar
Bidens pilosa L.			+	+		Cosmopolitan weed
Bidens schimperi Sch. Bip. ex Walp.					+	From Ethiopia to Natal and westwards to Angola
Boerhaavia diffusa L.		+	+	+	+	Pantropical
Boerhaavia erecta L.		+			+	Widespread in the tropics of Old and New Worlds
Borreria scabra (Schum. & Thonn.) K. Schum.		+	+	+		Tropical Africa and Madagascar
Brachiaria eruciformis (J.E. Smith) Griseb. (B. isachne Stapf)	+					Widespread in the warmer parts of America; also in tropical Africa and southern Africa
Cardiospermum halicacabum L. var. *halicacabum*	+					Tropics and subtropics of the World
Cassia mimosoides L.			+			Widespread in tropical Africa and Asia
Cassia petersiana Bolle			+			Widespread in eastern Africa, extending from Ethiopia and the Sudan Republic, southwards to Zimbabwe Mozambique and South Africa. Also in Madagascar
Celosia trigyna L.			+			Widespread in Africa. Also in Arabia and Madagascar
Chenopodium album L.	+					Widespread in the temperate and warm parts of Northern Hemisphere; S. America and Australia; in Africa (other than N.); recorded from Congo, Mozambique and S. Africa
Chrysanthellum americanum (L.) Vatke					+	A cosmopolitan tropical weed
Cleome gynandra L. (Gynandropsis gynandra (L.) Briq.)	+					Widely distributed in Africa, Madagascar, Mediterranean region, Asia, Polynesia and tropical America
Cleome monophylla L.				+	+	Widely distributed through Africa and Ceylon
Commelina benghalensis L.	+			+		A common weed through the tropical and subtropical regions of Old World
Commelina undulata R. Br. (C. gerrardii C. B. Cl.)	+					North Australia, also found in Asia and Africa
Commiphora edulis (Klotzsch) Engl.		+				Botswana, Zambia, Zimbabwe and Malawi; also Transvaal and Tanzania
Corchorus tridens L.		+	+	+	+	Widespread in the tropics and subtropics of Old World
Corchorus trilocularis L.			+	+		Widespread as annual weed in Africa and Asia
Crotalaria virgulata Klotzsch		+	+	+		Tanzania, Mozambique, Malawi, Zimbabwe, Botswana and South Africa
Cryptolepis obtusa N.E. Br.				+		Tanzania, Mozambique, Zimbabwe and South Africa
Ctenolepis cerasiformis (Stocks) Hook. f. (Blastania cerasiformis (Stocks) A. Meeuse)		+				Old World tropics from Mauritania and Senegal east to India and in East Africa south to Transvaal
Cucumis anguria L.		+				Tropics of Africa, Australia and New World
Cyperus amabilis Vahl			+			Pantropical and subtropical
Cyperus rotundus L.	+					Pantropical and subtropical
Cyperus sphacelatus Rottb. var. *tenuior* C.B.Cl.				+		Throughout tropical Africa, Madagascar, Malaysia and N. Australia
Dactyloctenium aegyptium (L.) Willd.			+	+		Throughout the Old World tropics; introduced into America
Dactyloctenium giganteum Fisher & Schweick.		+				Tanzania, Zambia, Zimbabwe, Botswana, S.W. Africa and South Africa
Digitaria ciliaris (Retz.) Koel. (D. adscendens Henr.)				+	+	Throughout the tropics
Digitaria milanjiana (Rendle) Stapf		+				Congo, Angola, Zambia, Zimbabwe, Tanzania, Kenya, Malawi and South Africa; also in Madagascar
Digitaria perrottetii (Kunth) Stapf				+		Tropical Africa and Madagascar
Digitaria setivalva Stent				+		Uganda, Tanzania, Zambia, Zimbabwe, Botswana, S.W. Africa and South Africa
Eleusine coracana (L.) Gaertn.					+	Tropical Africa; also in East Africa from Ethiopia to Natal
Eleusine indica (L.) Gaertn.				+		Throughout the tropics
Eragrostis aethiopica Chiov.				+		Tropical Africa and South Africa
Eragrostis aspera (Jacq.) Nees		+		+	+	In tropical and South Africa, extending throughout Egypt and Arabia to India
Eragrostis cilianensis (All.) Lutati		+	+			Widely spread throughout tropics and warm temperate regions
Eragrostis ciliaris (L.) R. Br.			+	+	+	Throughout the tropics
Eragrostis cylindriflora Hochst. (E. horizontalis Peter)			+	+	+	Tropical and South Africa
Euphorbia hirta L.			+	+	+	Widespread in tropical and subtropical countries
Fimbristylis hispida (Vahl) Kunth (F. exilis Kunth)					+	Widespread in tropical and S.W. Africa
Gisekia pharnaceoides L. var. *pharnaceoides*	+			+		Widespread from Tropical Africa, South Africa and Mascarene Is. to India and Ceylon
Gisekia africana (Lour.) Kuntze		+				Widespread from tropical and Southern Africa to Asia
Hackelochloa granularis (L.) Kunze		+				Throughout the tropics
Hermannia kirkii Mast.		+				Botswana, Zimbabwe, S.W. Africa, Angola and South Africa (Transvaal); also in Kenya and Tanzania
Hewitia sublobata (L.f.) O. Ktze		+				Throughout tropical Africa, Asia, Malaysia and Polynesia, also in Jamaica as an escape
Hibiscus caesius Garcke		+				Tropical and subtropical regions of the Old World
Hibiscus sidiformis Baill.		+				Widespread in tropical and South Africa and in Madagascar
Hibiscus surattensis L.				+		Widespread in the tropics of the Old World
Hibiscus vitifolius L. subsp. *vulgaris* Brenan & Exell	+	+	+			Widespread in tropical and subtropical regions of the Old World
Hybanthus enneaspermus (L.) F. Muell. var. *enneaspermus*	+					From Senegal and the Sudan to Angola, Botswana, Transvaal and Natal; also in Madagascar, the Comoro Islands, Socotra, Arabia, tropical Asia from Ceylon to Haman, Malaysia and Australia
Hyparrhenia dichroa (Steud.) Stapf				+		Southern Africa from Zambia to Natal, and also in Sudan and Ethiopia
Hyparrhenia filipendula (Hochst.) Stapf var. *filipendula*	+		+	+	+	Throughout tropical Africa, and in Asia from Ceylon to Australia
Hyparrhenia rufa (Nees) Stapf var. *rufa*	+	+			+	Throughout tropical Africa, and also in tropical America. Introduced into most other tropical countries
Hyparrhenia variabilis Stapf					+	Eastern Africa from Ethiopia to the Transvaal
Hyperthelia dissoluta (Nees ex Steud.) W.D. Clayton	+			+		Now a cosmopolitan in the tropics and subtropics
Indigofera colutea (Burm. f.) Merr. var. *colutea*				+		Extending through Arabia, India and Indonesia to Australia and south to the Transvaal
Indigofera demissa Taub.					+	Congo (Katanga), Malawi, Zambia, Zimbabwe, E. Africa, S.W. Africa; also Madagascar
Ipomoea arachnosperma Welw.		+				Uganda, Kenya, Tanzania and throughout tropical Africa and India
Ipomoea coptica (L.) Roem. & Schult. var. *coptica*					+	Throughout tropical Africa, South Africa, Uganda, Kenya and Tanzania; tropical Asia and northern Australia
Ipomoea obscura (L.) Ker-Gawl. var. *obscura*	+					Throughout tropical Africa
Ipomoea pes-tigridis L. var. *pes-tigridis*		+	+			Extends to Sudan, Somaliland and S.E. tropical Africa; also in Mauritius and tropical Asia
Ipomoea sinensis (Desr.) Choisy subsp. *blepharosepala* (A. Rich.) Verdc.	+					In the tropics of Old World
Jacquemontia tamnifolia (L.) Griseb.				+		A native of tropical America, found there in all warmer parts, naturalized in tropical and South Africa, and the Mascarene Islands
Leptocarydion vulpiastrum (De Not.) Stapf		+			+	Tropical east Africa, central and southern Africa
Leptochloa panicea (Retz.) Ohwi	+					From tropical Asia now widely distributed in tropical Africa
Limeum sulcatum (Klotzsch) Hutch. var. *sulcatum*		+				Angola, South and S.W. Africa, Botswana and Zimbabwe
Markhamia obtusifolia (Bak.) Sprague			+	+		Congo, S.W. Africa, Zimbabwe and Botswana
Melhania forbesii Planch. ex Mast.	+	+				Zambia, Zimbabwe, South Africa (Transvaal), S.W. Africa and Angola
Mollugo nudicaulis Lam.		+	+			Pantropical
Momordica kirkii (Hook. f.) C. Jeffrey (Raphanocarpus kirkii Hook. f.)		+				S.W. Africa, Zambia, Zimbabwe, Malawi, Tanzania
Mucuna coriacea Bak. subsp. *coriacea*			+	+		Tanzania, Mozambique, Malawi and Zambia
Monotes africanus A. DC.					+	Angola, Tanzania, Malawi and Congo
Ocimum canum Sims	+	+	+		+	Africa, Asia and tropical America
Oldenlandia caespitosa Hiern var. *subpedunculata* (Kuntze) Brem.			+		+	Africa tropical and subtropical; Malgasciam and Syriam
Oxalis semiloba Sond. subsp. *semiloba*	+					Ethiopia, Kenya, Congo, Tanzania, Angola, Botswana, Zimbabwe, Zambia, Malawi and South Africa
Panicum maximum Jacq.		+	+	+		Throughout the tropics
Pennisetum polystachion (L.) Schult.			+	+	+	Throughout the tropics
Phyllanthus pentandrus Schumach. & Thonn.	+					Widespread in tropical Africa
Portulaca oleracea L.	+					A cosmopolitan weed of temperate and tropical regions
Portulaca quadrifida L.		+		+		Cosmopolitan as a weed in the tropics and subtropics
Pseudobrachiaria deflexa (Schumach.) Launert (Brachiaria deflexa (Schumach.) Hubb. ex Robyns)		+	+			Throughout tropical Africa, extending in to Arabia, Madagascar and South Africa
Pycreus pelophyllus (Ridl.) C.B. Cl.					+	Throughout tropical Africa and Madagascar
Rhynchelytrum repens (Willd.) Hubb.			+	+	+	Throughout tropical Africa and introduced to most other tropical countries
Ricinus communis L.	+					Generally believed to be native to Africa and India. Widespread in the tropics
Rottboellia exaltata L. f.		+	+			Throughout the Old World tropics and in the West Indies
Sesbania mossambicensis Klotzsch subsp. *mossambicensis*		+				Mozambique and Zimbabwe
Sida acuta Burm. f.				+		Widespread in the tropics and extending into S.W. Africa, Transvaal and Natal
Solanum panduraeforme E. Mey.			+			Widespread in tropical Africa
Solanum renschii Vatke		+				Tropical Africa
Sonchus bipontinii Aschers.			+	+		Uganda, Kenya, Tanzania; also in Ethiopia, Sudan, Rwanda and the Congo
Sonchus oleraceus L.	+					A native of Eurasia and N. Africa, now more or less cosmopolitan as a weed
Sorghum verticilliflorum (Steud.) Stapf	+					East tropical and southern Africa; Asia, Australia and W. Indies
Striga asiatica (L.) O. Ktze (S. lutea Lour.)		+	+	+	+	Widespread in tropical Africa and Asia, South Africa and the Mascarenes
Tabernaemontana elegans Stapf				+		Tanzania, Zimbabwe and South Africa
Tribulus terrestris L.	+	+	+	+	+	In tropical and temperate regions throughout the world
Trichodesma zeylanicum (L.) R. Br.			+	+	+	Distributed through India, Malaya, Australia and Africa
Tricliceras longepedunculatum (Mast.) R. Fernades var. *eratense* R. Fernandes			+			Known only from Mozambique. Endemic
Tridax procumbens L.			+	+	+	A native of central America, now widespread in tropical Africa, Madagascar, Asia and Australia. Also in South Africa
Triumfetta rhomboidea Jacq.			+			Known throughout the tropics and subtropics
Urochloa mosambicensis (Hack.) Dandy	+	+	+			Subtropical and southern Africa; Burma
Vernonia ambigua Kotschy & Perr.			+			Extending through the drier parts of tropical Africa to Sudan and Angola
Vernonia cinerea (L.) Less.	+		+	+		Widespread in tropical countries
Vernonia fastigiata Oliv. & Hiern	+				+	Tropical Africa
Vernonia glabra (Steetz) Vatke	+	+	+	+	+	Widespread in tropical Africa
Vernonia kirkii Oliv. & Hiern		+				Zambia, Zimbabwe and Mozambique
Vigna sp. (Balsinhas & Macuacua 543, at PRE)		+				–
Waltheria indica L.				+		Widely distributed through tropics and subtropics
Zaleya pentandra (L.) Jeffrey	+	+				Throughout tropical Africa from Transvaal to Egypt and Senegal; also in Arabia, Palestine and in Madagascar

* Study areas: 1, Chibuto; 2, Chemba; 3, Namapa; 4, Nampula; 5, Mutuali

In the sub-planaltic zones the succession on fallow and abandoned fields is towards a type of grassland with woody elements. In the first two years a thick, close sward is formed which, with correct management, can be useful for other agricultural activities such as grazing for cattle.

ACKNOWLEDGEMENTS

I wish to thank Mrs K. J. Musil for helping with the translation of the paper.

REFERENCES

ALMEIDA, F. S., 1970. Herbicides on cotton. II. Results of the trials carried out in Mozambique from 1963 to 1970. *Agron. mocambic.* 4,4: 253–264.

BALSINHAS, A., 1962. *Relatorio referente as observacoes efectuadas em pousios e campos de algadao nas Estacoes Experimentais de Namapa, Mutuali, Nampula e Chemba.* Lourenco Marques, Instituto do Algadao de Mocambique.

BALSINHAS, A., 1963. Lista alfabetica dos nomes botanicos das plantas espontaneas observadas em pousios e campos de algodao. Serie B: Divulgacao. *Gazeta Agric. Moçamb.*

LEMOS, F., 1961. *Relatório sobre a vegetacao de pousios das Estacoes Experimentais de Namapa e Chemba.* Lourenco Marques, Instituto do Algodao de Mocambique.