McGILL UNIVERSITY SAVANNA RESEARCH PROJECT
SAVANNA RESEARCH SERIES No. 7

CULTIVATED FOOD PLANTS OF THE RUPUNUNI

by

Jo Dagon

McGILL UNIVERSITY SAVANNA RESEARCH PROJECT
ST. IGNATIUS, RUPUNUNI DISTRICT, GUYANA

DEPARTMENT OF GEOGRAPHY
McGILL UNIVERSITY
MONTREAL, P.Q., CANADA

July 1967

Technical Report No. 8
Project NR 387-020-Contract No. Nonr-3855 (00)
OFFICE OF NAVAL RESEARCH, GEOGRAPHY BRANCH

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ABSTRACT

This is the first of the Savanna Research Series to focus its attention on agriculture in the savannas. The fields of the shifting cultivators and the ranch gardens are seen as integral parts of the savanna landscape. A checklist of the species grown at selected locations is presented and certain of the plants discussed. A description is given of the various cultivation site-types from shifting cultivation to the commercial truck-farm. In conclusion, the Amerindian need for help in procurement of seed and improved technology is stressed. The Rupununi is stated to have the potential to be self-supporting but never to be a garden-state to supply the rest of Guyana.

Theo L. Hills
Director
McGill University Savanna
Research Project

FIGURES AND TABLES

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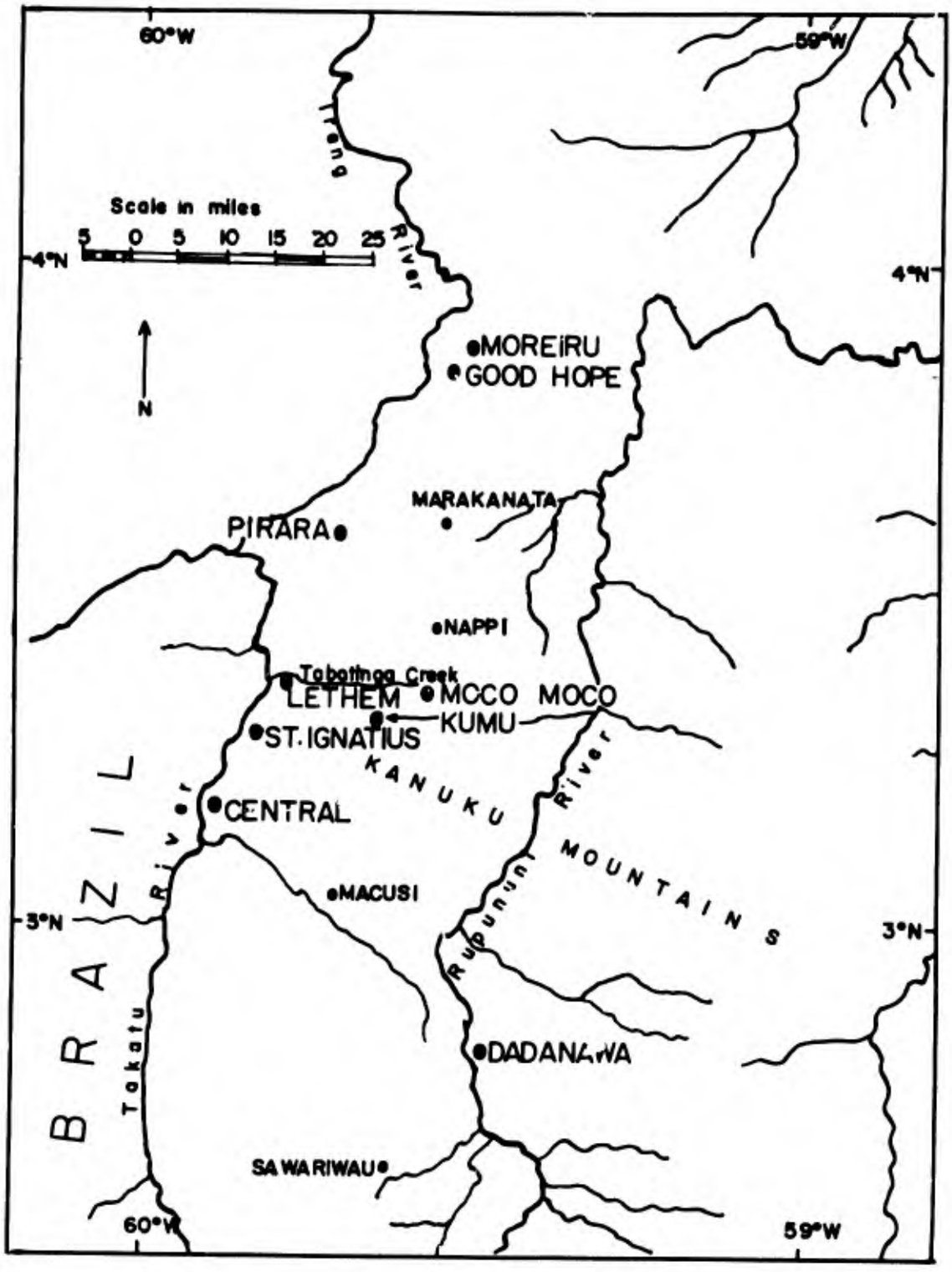
PREFACE

The field research that led to this paper 'Cultivated Food Plants of the Rupununi', was conducted as a contribution to the Savanna-Bush Environments Research project which has operated within the McGill University Savanna Research Project since May, 1962. The Savanna-Bush project is supported by the Geography Branch of the Office of Naval Research.

No study of the savanna landscape of the Rupununi District can restrict its attention to the savanna itself. The bulk of the provision fodder crops consumed in the region are grown in the zone of shifting cultivation within the surrounding forest and the bush islands of the savanna. From the point of view of the human occupance of the region, these areas are integral parts of the savanna landscape. In that the M.U.S.R.P. is giving an increasing amount of attention to the practice of shifting agriculture and its impact on the savanna landscape, it became essential to conduct an inventory of the cultivated plants of the Rupununi. The Project is grateful to Mrs. Jo Dagon for initiating this investigation.

Theo L. Hills,
Director,
McGill University Savanna
Research Project



Location Map - Rupununi Savannas

CULTIVATED FOOD PLANTS OF THE RUPUNUNI

Jo Dagon

McGill University Savanna Research Project
Lethem, Rupununi District, Guyana

INTRODUCTION

This paper presents a check list of species and descriptions and inventories of selected cultivated fields and gardens in the Rupununi Savannas of Guyana. The information was abstracted from field notes taken during the period 23 April - 14 May, 1967.

While the check list may not be complete in terms of all species cultivated in both the north and south savannas, it is most certainly representative of the area. To ensure adequate representation, a variety of cultivated sites were visited ranging from the fields of the traditional shifting cultivators (the semi-agriculture of the Amerindians) to the garden of the most recent emigrant to the Rupununi from temperate North America. No attempt was made during this preliminary survey to assess total acreage under cultivation but percentages of each specific crop within any particular cultivated area of known size were estimated in order to gain some indication of relative importance.

CHECKLIST OF CULTIVATED FOOD PLANTS ARRANGED ALPHABETICALLY BY BOTANICAL NAMES

Achras zapota	Sapodilla
Allium ascalonicum	Shallot, Eschallot
Allium cepa	Onion
Allium schoenoprasum	Chives
Anacardium occidentale	Cashew nut
Ananas comosus	Pineapple
Annona muricata	Soursop
Annona reticulata	Custard apple
Annona squamosa	Sugar apple, Sweetsop
Apium graveolens	Celery
Arachis hypogaea	Groundnut, Peanut
Artocarpus altilis	Breadfruit
Artocarpus altilis	Breadnut
Basella alba	Calalu

Basella rubra	Poi, Calalu
Bertholletia excelsa	Brazil nut
Beta vulgaris	Beet
Brassica chinensis	Pak choi, Chinese cabbage
Brassica juncea	Mustard
Brassica oleracea var. botrytis	Cauliflower
Brassica oleracea var. capitata	Cabbage
Brassica parachinensis	Japanese spinach
Brassica rapa	Turnip
Cajamus caja (cajanus cajan)	Pigeon peas, Dhal
Capsicum frutescens var. grossum	Sweet pepper
Capsicum frutescens var. longum	Hot pepper, Chili pepper
Carica papaya	Pawpaw, papaya
Chrysophyllum cainito	Star-apple
Citrullus vulgaris	Watermelon
Citrus aurantifolia	Lime
Citrus limon	Lemon
Citrus medica	Rough lemon
Citrus paradisi	Grapefruit
Citrus sinensis	Sweet orange
Cocos nucifera	Coconut
Coleus barbatus	Coarse leaf thyme
Colocasia esculenta	Eddoe (eddo)
Cucumis melo	Musk melon
Cucumis sativus	Cucumber
Cucurbita maxima	Pumpkin
Cymbopogon citratus	Lemon grass, Fever grass
Daucus carota	Carrot
Discorea cayenensis (Dioscorea cayenensis)	Yam
Echinocystis sp.	Wild cucumber, Marchech
Eugenia malaccensis	Cashew, French cashew
Eugenia patrisii	Wild cherry, Cherry
Eugenia uniflora	Surinam cherry
Ficus carica	Fig
Flacourtia indica	Psidium
Hibiscus esculentus	Okra, Ochro
Hibiscus sabdariffa	Sorrel
Inga sp.	Whytee
Ipomoea batatas	Sweet potato
Lactuca sativa	Lettuce
Lagenaria vulgaris	Squash
Lippia micromera	Fine leaf thyme
Lycopersicon esculentum	Tomato
Lycopersicon esculentum var. cerasiforme	Cherry tomato
Lycopersicon esculentum var. pyriforme	Plum tomato
Malpighia punicifolia	Barbados cherry

Mangifera indica	Mango
Manihot esculenta	Cassava
Maranta arundinacea	Arrowroot
Melicocca bijuga	Genip, Wild plum
Musa nana	Dwarf banana
Musa paradisiaca	Plantain
Musa paradisiaca var. sapientum	Red banana
Musa sp.	Banana
Oryza sativa	Rice
Passiflora edulis	Passion fruit (vine)
Passiflora incarnata	Bell apple
Persea americana	Avocado pear
Petroselinum crispum	Parsley
Phaseolus aureus	Mung bean
Phaseolus vulgaris	Green or snap bean
Piper nigrum	Black pepper
Psidium guajava	Guava
Punica granatum	Pomegranate
Raphanus sativus	Radish
Saccharum officinarum	Sugar cane
Solanum melongena	Eggplant
Spondias cytherea	Golden apple
Spondias mombin	Hog plum
Syzygium cuminii	Jamoon
Vigna sesquipedalis	Yard long or Borah bean
Vigna sinensis	Black eye or Cowpea
Vigna unguiculata	Borah bean
Vitis vinifera	Grape
Xanthosoma braziliense	Calalu, Kale
Zea mays	Corn
Zizyphus mauritiana	Downs, Dunks

The recent movement of people into the interior from the coast has had a major impact on this check list of species which will become readily apparent when one looks at a few specific garden inventories. Cassava is the dominant crop in the Rupununi and the diet of the Amerindian is based on it, principally in the form of farine and the cultivated fields are generally uniform in their make-up and somewhat similar to those at Kumu described further on.

Within the above check list, there are two groups that can and will cause particular difficulty -- the bananas (Musa) and cassava (Manihot). For the purpose of this report, all bananas, other than the dwarf banana (Musa nana) and the red banana (Musa paradisiaca sapientum), have been lumped together as Musa sp. In a similar fashion, the many varieties of both bitter and sweet cassava have been lumped together as Manihot esculenta though certainly some horticulturists would distinguish between M. esculenta (bitter cassava or manihot) and M. dulcis (sweet cassava). Note also that

breadfruit and breadnut are listed under the same species (Artocarpus altilis). In general, the breadfruit is seedless or at least nearly seedless, whereas the breadnut bears large quantities of edible seeds. There would be little value in distinguishing between the varieties of tomatoes with the exception of the cherry (Lycopersicon esculentum cerasiforme) and plum (Lycopersicon esculentum pyriforme) for the seeds for most of the tremendous variety being planted come from world-wide commercial dealers without suitable botanical identification.

No attempt has been made to list plants, other than those actually cultivated and personally observed by the author. A preliminary listing of all food plants of British Guiana was prepared by Wheat (1965)[1] and the nomenclature in the above check list corresponds to Wheat's in so far as was possible, with some alternative spelling, in brackets, from L. H. Bailey's[2] classification. Salisbury and Hills (1967)[3] listed two plants cultivated by the Wapishana in the Southern savannas which were not observed by the author, they are the prickly-pear (Opuntia dil enii) -- which was also not included in the check list prepared by Wheat -- and mint (Mentha viridis). Common names given are those used within the Rupununi and many other common names might well be applied to the same plant in different areas of the country. The above check list adds two genera (Echinocystis and Ficus) and five species (Allium cepa, Brassica parachinensis, Ficus carica, Musa nana, and Passiflora incarnata) to the known food plants of Guyana. In addition, three known varieties have been added to the same list (Lycopersicon esculentum var. cerasiforme and var. pyriforme and Musa paradisiaca var. sapientum).

Two plants commonly cultivated with the above, but not for food, are the calabash (Crescentia cujete) and cotton (Gossypium sp.). On the other hand, very little tobacco was observed being grown, most of the tobacco available locally appears to now come from Brazil. No tea or coffee was found, though several residents of the Moco-Moco area are considering raising coffee in the Kanuku foothills.

The recent limited success of one or two individuals has resulted in quite a few people, other than Amerindians, suddenly undertaking to raise tomatoes as a cash crop to be marketed in Georgetown. This has resulted in a temporary flood of tomatoes of generally poor quality on the local (Lethem) market and it will be a year or more before the success of this venture can be fully evaluated. Corn raised by the Amerindian in small amounts is often utilized as a cash crop and sold to the local ranchers as supplemental feed for their livestock. There is one large scale ground-nut operation under way at Moco-Moco Village but it is making limited progress due, primarily, to the difficulty in establishing a suitable irrigation system. Ground-nuts are an attractive crop since the government guarantees purchase of the harvest and the Department of Agriculture provides both seed and technical aid to a limited degree.

The mango, common throughout the Rupununi, is generally found within the village or home sites, not in the cultivated fields. Coconuts are successful where manure and/or fertilizer, combined with an adequate soil builder, has been applied; in other areas, the fruit often fails to mature before dropping from the tree. The lettuce and radish are currently popular and this is

apparently due to their ease of cultivation. Surprisingly the Amerindians do not enjoy the radish claiming it is too "hot". Pawpaw (several species and varieties) is the most popular fruit crop after the mango, banana, and plantain. Of the citrus grown, limes are the most common and by far the most successful, followed by the lemon; oranges and grapefruit generally require more care.

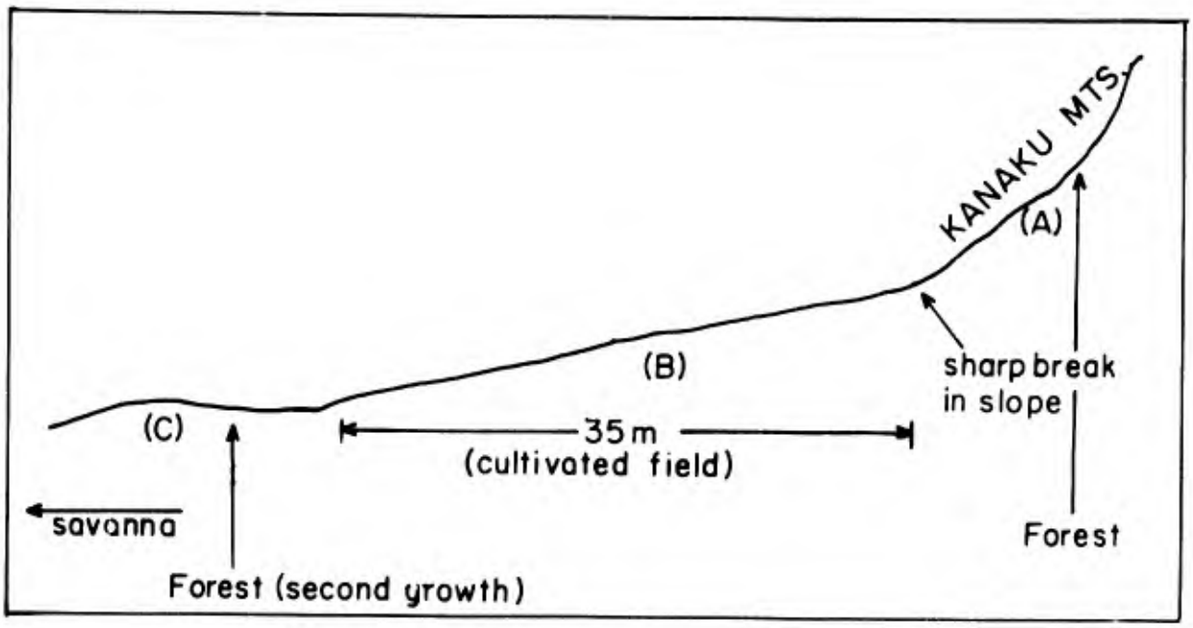
CULTIVATION SITES

Shifting Cultivation Site

Kumu. This site is located on the south bank of the Kumu River in the foothills of the northwest slopes of the Kanuku Mountains. The fields visited have been cut from the montane rain forest which covers these slopes and the forest itself shows some evidence of previous disturbance by fire sweeping up the better drained slopes and ridges. The five fields which make up this particular complex belong to a Macusi Indian named Joseph who lives at St. Ignatius but maintains several dwellings at Kumu in addition to his house near the mission. The fields support some 20-24 individuals, all members of the same family group, and one or more of the family resides at Kumu on a year-round basis.

The soils of this general area were mapped as a part of the Lethem-Burru Association, a well-drained soil of the undulating uplands (see Jones et al, 1958)[4], and are part of a study area being utilized on a long-term basis by Ken Rutherford of Queen's University in his continuing pedological research across the forest/savanna boundary and in sites of shifting cultivation (see report by T. L. Hills, March 1967)[5]. Rainfall is not recorded at this particular site, but annual rainfall here must closely approximate that of a similar bush site maintained by M.U.S.R.P. at nearby Moco-Moco which has an estimated annual rainfall in the region of 160 cms.

The approximate 15-mile walk to St. Ignatius is made by one or more members of the family at least every two or three days, all the foodstuffs being carried in packs on the backs of any member of the family large enough to walk (see Figure 1). The proximity of these fields to the forest is clearly shown in Figure 2 which also includes an abstract description of the upper field in this five-field complex. This upper field contains the greatest variety of cultivated plants, sugar cane, eddoe, plantain, pawpaw, cotton, sweet potato, pineapple, hot pepper, and black pepper, but no cassava A photo of this upper field, taken in the fall of 1966, is shown in Figure 3. The lower fields are devoted primarily to cassava with some corn and pawpaw inter-planted. The larger of these lower fields, approximately 1½-2 acres in extent, is planted solely in cassava with approximately 50% of the field now 1.5-2 meters in height and the remainder more recently planted, 0.5-1 meter in height. Nearly all of the individual cassava shrubs, regardless of height, showed signs of nutrient deficiency, most likely phosphate.



LEGEND

O Erect woody plants

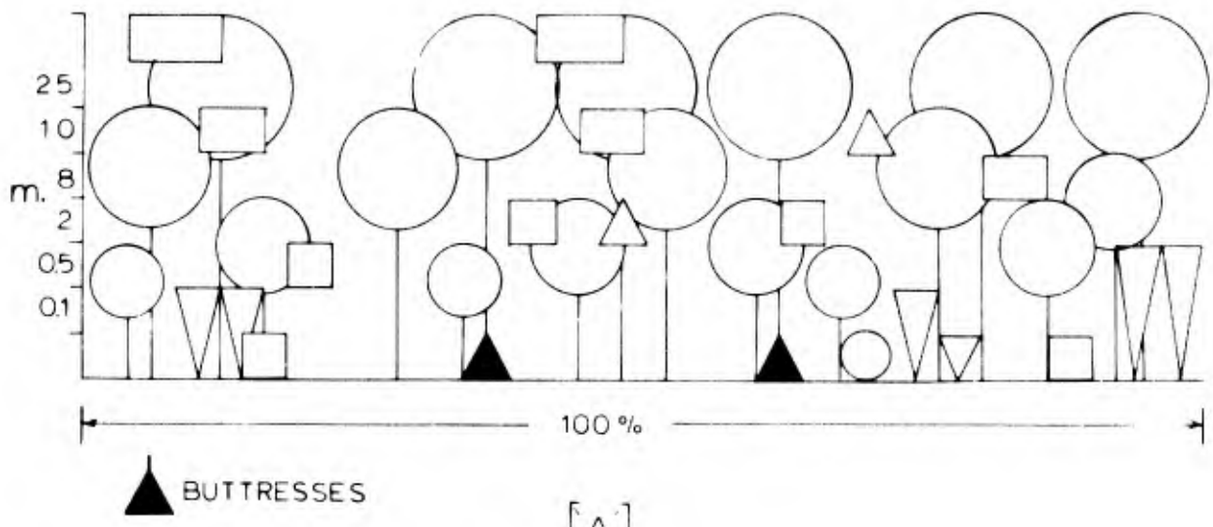
□ Decumbent or climbing woody plants

Δ Epiphytes

∇ Herbs

Fig. 2

The relationship of the upper fields of cultivation at Kumu to the topography and forest-savanna boundary. An abstract structural description of one of these cultivated fields is shown in ('B') while similar descriptions of the immediately adjacent forest is shown in ('A') and ('C'). This method of description has been slightly modified from that of Dansereau, Buell, and Dagon (1966)[6] in order to accomodate the cultivated plants: pawpaw (CP), plantains (MP), sugar cane (so), cotton (G), black pepper (PN), hot or chili pepper (CF), pineapple (ac), eddoe (ce), and sweet potato (ib). No cassava had been planted in this particular field. These descriptions were provided by Ronald Dagon (of MUSRP) from a portion of a total description of shifting cultivation in this particular area during the period of 1966-67, currently being prepared (pers. comm.).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2
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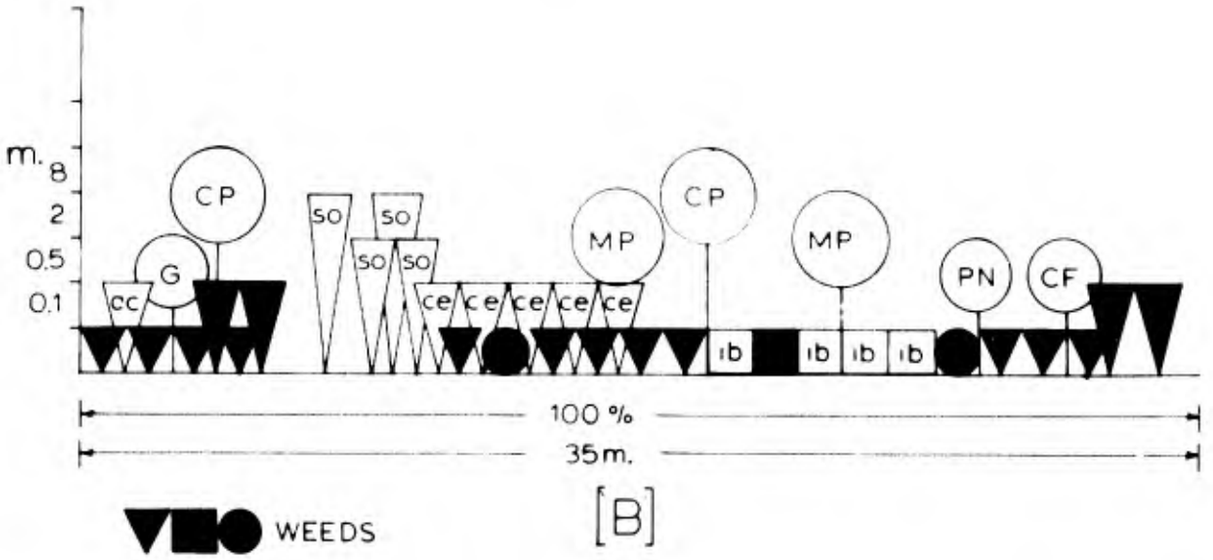
BUTTRESSES

[A]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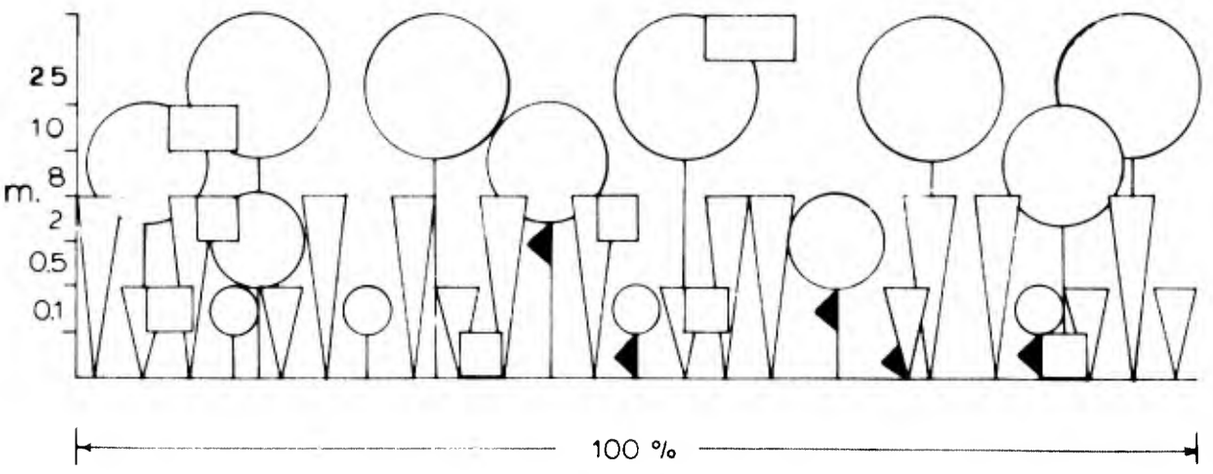
35m.
WEEDS

[B]


25
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SPINES ON STEM

[C]

Fig. 1 Macushi women carrying loads of cassava roots (35-75 lbs a load) from Kumu fields to St. Ignatius village.

Fig. 3 Kumu - upper field showing pineapple, pawpaw and banana in a field of sweet potato.

There is one exceptionally large (1½ acres) banana and plantain grove adjacent to the main trail and lower fields. Bananas, pawpaws, cotton, eddoes, and a single genip tree are cultivated near the houses bordering the river. Of the approximately ninety food plants on the check list, only eighteen are found in these fields and of these eighteen, only cassava, banana and plantain are significant. With the exception of some of the surplus bananas and plantains, all of these crops are utilised directly by Joseph and his family. In Figure 4 two types of the hot or chili pepper (Capsicum frutescens longum) so commonly used in local cooking throughout the Rupununi are shown for comparison along with the black pepper (Piper nigrum).

Other Forms of Savanna Agriculture

The cultivated sites described below are certainly not typical of the semi-agriculture or shifting cultivation sites of the Amerindian fields as seen at Kumu. However, these sites do represent the new shape of agriculture within the savannas where ranchers and newly arrived settlers from the coast are having a major impact. The dominant semi-agriculture or shifting cultivation in the savannas is accompanied then by at least three other types of agriculture. First, the home or ranch garden where the products are for home consumption (Moreiru, Dadanawa, Central and St. Ignatius); second, a share-cropper operation where the products are utilized for a cash crop (Moco-Moco) and the surplus for home use; and third, the commercial truck farm (Pirara and Lethem). In addition, one of the principal efforts of the local representatives of both the Peace Corps and Canadian University Volunteers Overseas is directed at classwork and practical experience in agricultural techniques with the secondary students at the St. Ignatius school. The agricultural officer at St. Ignatius is cooperating and several diversified school gardens and an orchard have been established. The influence of this training and experience with a greater variety of plants will be shown when these Amerindian students return to their respective villages.

1. Home or Ranch Garden.

Moreiru. This is a home garden at the ranch of Harry and Valerie Hart. It is located just one-half mile west of Moreiru Lake, some five miles northeast of Good Hope on the east bank of the Ireng River. This particular garden, with its tremendous variety, reflects the background and tenacity of Valerie Hart who was raised on the coast and is of Chinese extraction. Forty species of useful food plants were found in this 3-4 acre garden which is securely fenced from livestock. Many of the individual plants found here were hand-carried by a member of the family from Georgetown after being procured, either from friends or through the Botanical Garden. Raised (1m.) seed beds are used both for seedlings and for such crops as lettuce and Japanese spinach. Water for irrigation is provided either by an adjoining windmill (which is generally incapable of supplying the needs of the house, garden, and domestic stock) or is carried

Fig. 4

Two of the common types of the hot or chili pepper (Capsicum frutescens longum) shown for comparison with the fruit of the black pepper (Piper nigrum) in the center. The upper pepper in the photo is locally termed Wiriwiri and the lower Marawiri; both are quite pungent and vary in color from a pale green to bright red or orange.

in barrels by truck from the Ireng. The garden itself is close to the main house on a soil described as part of the Ireng series, a moderately well drained soil formed on the terraces and outwash fans. Manure, gathered from the milk-herd corral, is used for fertilizer.

Avocado
Beet
Black pepper
Breadfruit
Breadnut
Carrot
Cashew
Cauliflower
Celery
Coarse leaf thyme
Custard apple
Eggplant
Genip
Grapefruit
Guava
Hot pepper
Japanese spinach
Lemon
Lettuce
Lime
Mango
Mustard
Onion
Parsley
Pineapple
Peanut
Pomegranate
Psidium
Pumpkin
Radish
Soursop
Sugar apple
Surinam cherry
Sweet orange
Sweet pepper
Sweet potato
Tomato
Turnip
Wild cherry
Yard long beans

Dadanawa. This site in the south savannas is the garden at the home ranch of the Rupununi Development Company. The garden itself occupies approximately one acre and is securely fenced against livestock. There are several permanently raised (1m.) seed beds and both the beds and the remainder of the garden are fertilized primarily with cow manure. Ample water, drawn from an elevated storage tank filled by a windmill or gasoline operated pump, is available for irrigation by means of a garden hose. All of the crops are grown for consumption at the home ranch and the garden is maintained by Amerindian labour under the close supervision of a Canadian, Jimmy Brown.

In the list below, items marked with an asterisk are to be found growing outside the garden fence but well within the ranch building complex. Approximately 30-35% of the garden is devoted to citrus and of this amount some 80% is grapefruit.

Banana (no Plantain)
Borah bean
* Brazil-nut
Cabbage
Calalu
* Cashew nut
Cauliflower
* Coconut
Eddoe
Grapefruit
Lemon
Lettuce
Lime
* Mango
Muskmelon
Onion
Passion fruit (vine)
* Pawpaw
Sweet orange
Tomato

Central. Central, the home ranch of Leonard d'Aguiar, a long term resident of the Rupununi, is situated on the alluvial soils adjacent to the Takutu River. The garden and supplemental fields are located near the main ranch house and within a large corral complex. The use of fertilizer and manure, plus careful irrigation, has produced a very successful garden, the crops being used only for home consumption.

Banana	Lemon grass
Black pepper	Lettuce
Cabbage	Onion
Carrot	Pawpaw
Cassava	Pigeon pea
Celery	Plantain
Cowpea	Sweet orange
Eggplant	Sweet pepper
Grape	Thyme
Hot pepper	Tomato
	Watermelon

Numerous mango trees surround the ranch building complex and corrals. In the elaborate corral, used both to handle the milk cows and for cattle control during preparation for market shipment, a rotation system is employed in order to grow both corn and cassava. In one section of the corral milk cows are kept overnight for a period of a year or more, thereby concentrating nutrients from the urine and manure. The section is then ploughed and planted with corn. After the corn is harvested, the section is planted with cassava. Following this 18-24 month period, the section is once more used as a corral. This system, utilized also at San Jose and Sand Creek, results in excellent yields of both corn and cassava (see Figure 5). At Central, the corn is used both for home consumption and as feed for the chickens and hogs.

St. Ignatius. There is a variety of agricultural activity in and around the mission at St. Ignatius. Many of the resident Amerindians have small plantings of yams and eddoe and some shifting cultivation is being carried on in the gallery forest along the Moco-Moco and Takutu Rivers. However, these fields are generally poor and most of the food consumed is carried in from the Kumu fields.

As mentioned previously, several gardens have been installed by the secondary school students, one at the stock-farm and another near the hostel in the school grounds. At the Department of Agriculture stock-farm, the three main residential buildings all have fenced gardens. One, a small garden, is being maintained by the M.U.S.R.P., and in another, the resident agricultural officer is experimenting with a large variety of tomatoes as well as vegetables (mostly beans). Of these gardens, the most elaborate is that of the Veterinary office which is generally maintained by a full-time gardener. Raised 55 gallon drums (cut in half) are used both for seed beds and for permanent beds of spices and lettuce. Coupled with the extensive

Fig. 5 (above and left) The corral complex at Central, the home ranch of Leonard d'Aguiar, with an excellent crop of cassava ready for harvest. This cassava in its 2nd year of growth (some 3-4 m. in height) was the finest stand observed growing in the entire Rupununi. The field itself is in its 3rd year of use for cultivation, a successful harvest of corn being made before this cassava was planted. After the harvest of the cassava, this particular section of the corral will revert to utilization as a holding pen for the dairy herd.

floral plantings, this showplace garden serves to demonstrate what can be accomplished when attention is given to proper fertilization, weeding, irrigation, and chemical methods of insect control.

Banana	Lemon
Borah beans	Lemon grass
Calalu	Lettuce
Cherry tomato	Lime
Coconut	Passion fruit
Corn	Pawpaw
Eddoe	Pineapple
Fine leaf thyme	Plum
Grapefruit	Squash
Grape	Sweet orange
Guava	Sweet pepper
Hot pepper	Sweet potato
Jamoon	Sweetsop
	Watermelon

2. Share-Cropping.

Moco-Moco. A new operation now under way is the farm of Walter Li (the local agent for Guyana Airways Corp.). An East Indian farmer from Bartica was hired to manage the farm and establish several large fields on the south bank of the Moco-Moco in the foothills of the Kanukus. This is an excellent site, the soil here being a colluvial sandy loam on the debris slope of the mountain. Irrigation, as required, is provided by hand-pumping from the Moco-Moco. Some 9 acres have been cleared since January of this year of which 4 are already under cultivation with resultant superior crops of tomatoes and corn (see Figure 6). Over one acre has now been planted with rice, young mango trees are found inter-planted between fields, and small plantings of yard long beans, green snap beans, eddoe, cabbage and okra have been established. Several acres will be planted with cassava. The success of this operation could well persuade other Lethem residents to consider importing coastal farm labour to work on a share-crop basis.

3. Commercial Truck Farm.

Pirara. This site is included because, in addition to the home gardens and perhaps the most extensive mango and coconut grove in the savannas (see Figure 7), a cooperative venture for growing tomatoes commercially has been initiated. It is situated two miles south of the main ranch on a well-drained upland site of some 5-6 fenced acres. The intent is to rotate plots in such a manner that approximately one acre of tomatoes can be harvested throughout the year. Both cow manure, mixed as a compost, and commercial fertilizers are being used. All beds have been raised and field borders ditched to provide adequate drainage (see Figure 8) during the rainy season.

Fig. 6 (above and left) A portion of the newly cultivated fields (a commercial venture) on the south bank of the Moco-Moco in the Kanuku foothills. The left photo shows the partial harvest in April of a corn crop established in February. The East Indian farmer shown in the photo was brought into the interior from the coast to work on a share-cropper basis.

Fig. 7
Coconut palms and mango trees around the Pirara homestead.

Fig. 8
A portion of the 5-6 acres of tomatoes being grown just south of the main ranch complex at Pirara, on a commercial basis, for sale in Georgetown. Note the raised beds and the ditches in the foreground - both required for the successful control of runoff during the rainy season and for the future establishment of a suitable irrigation system.

No irrigation system has yet been established, but some means must be found to develop and utilize the copious year-round spring bordering the farm. Excellent lettuces and radishes have already been produced. A large variety of trees including sapodilla, golden apple, pawpaw, downs, mango, coconut, jamoon, cherry, and hog plum form an orchard near the farm fields. The success of this operation will depend on the establishment of suitable outlets in Georgetown, on the arranging of suitable packing and transportation to minimize damage, and later on the ability to meet an established demand on schedule.

Lethem. Along the north bank of the Tabatinga Creek, near its junction with the Rio Takutu, in an area of well-drained upland soil (Lethem-Burru Association), lies one of the larger, more diverse, and perhaps the best managed truck farm in the interior. Owned by Teddy Melville and managed and operated by Aldenez Leouirio Pontes, the farm is approximately 5 acres in extent and is a well-planned system of fields with suitable irrigation and fertilization. The farm is divided into plots consisting of seed bed tables (sheltered by fruit bearing trees), vines, beans, peas, sweet peppers, plum tomatoes, plantain, banana, tomatoes, a fruit orchard, and a new field (see Figure 9). The entire area is surrounded with a 1.5m. high wire fence to keep out livestock, and a portion of the house-store complex forms the southern boundary.

To the rear and in close proximity to the store are the seed bed tables. There are 14 large tables made from the outer bark of the Ité palm. Dimensions of these tables average 3m. by 1.5m. by 2.5m. and are supported on stilts 1m. in height (see Figure 10). The seed bed tables last only one year before rotting, after this the remains are mixed with manure and used as a fertilizer and soil builder. New plantings in the seed bed tables at the time of this visit were tomato, onion, cabbage, peppers, and shallot. Other seed beds contained mature plants of poi or calalu, onions, lettuce, and mustard. The joint trees providing partial shading and a functional windbreak for these seed beds include:

Banana	Mango
Cashew nut	Pawpaw or Papaya
Coconut	Soursop
Fig	Sugar apple or Sweetsop (also plantings of 14 young trees)
Grapefruit	Sweet orange
Guava	Whytee
Jamoon	
Lemon	
Lime	

Near the fence, between the orchard and fields, grow numerous vines of marchech (wild cucumber) intertwined with watermelon and musk melon. These vine crops keep many weeds in check and provide a cash crop during periods when the main crop, tomato, is immature. Next to this mixed vine field are three trenched rows, 7m. long, of sweet or bell peppers, three rows, 10m. long, of yard long beans (often confused with borah), and three rows, 3.5m. long, of dahl or pigeon peas.

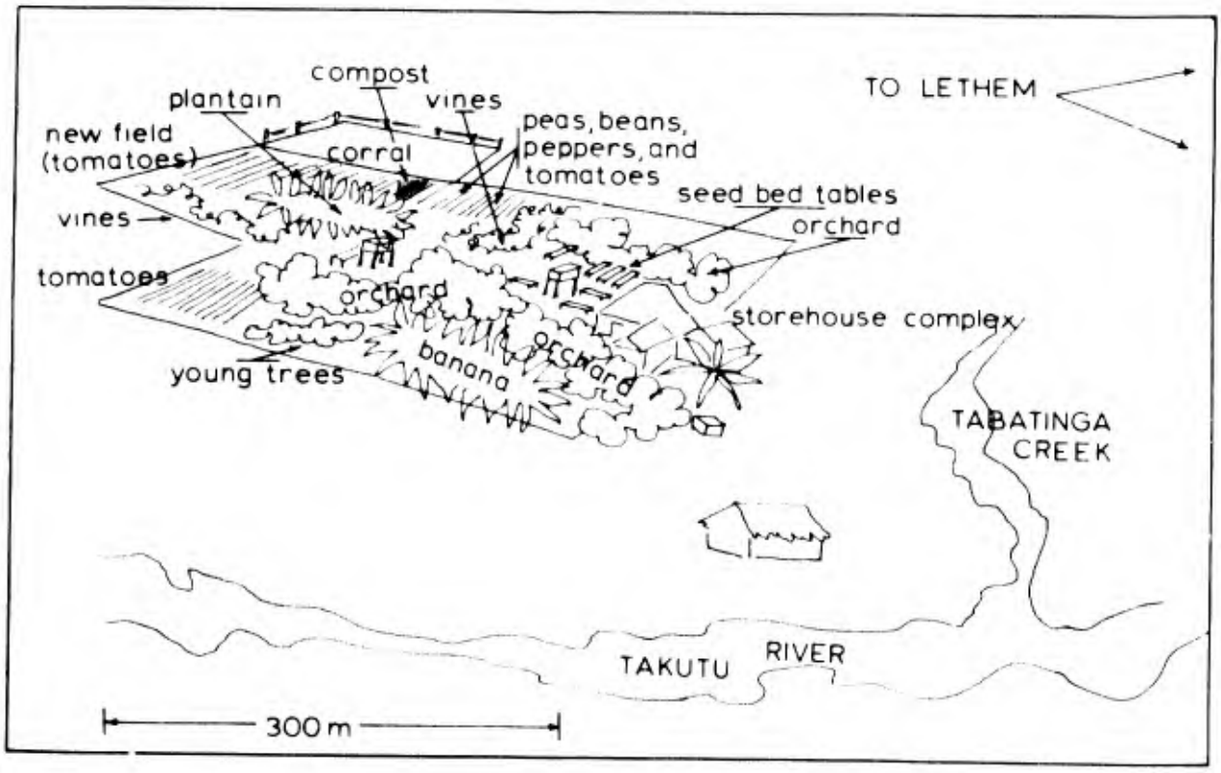

Fig. 9

A sketch (prepared from a low-level photograph taken by Herb Morgan of the Missionary Aviation Fellowship in May, 1967) of the commercial truck-farm owned by Teddy Melville and located on the north bank of the Tabatinga Creek adjacent to the Rio Takutu (from which water is supplied for irrigation). Note the diversity and layout of this successful operation which supplies a major portion of the local foodstuffs available for purchase in nearby Lethem.

Fig. 10

The raised seed beds at Teddy Melville's commercial farm on the north bank of the Tabatinga. These beds are used primarily for tomatoes, onions, peppers, and shallot as well as lettuce and mustard.

The largest and most productive plots, in terms of cash revenue, are to the extreme rear of the farm and consist of ten 30-35m. neat rows of staked tomatoes (see Figure 11). These tomatoes are taken from the seed beds when they reach a height of 15-20cm. and are transplanted into mounds in rows where they mature in about 8 weeks and bear fruit for another 8 weeks. When the bearing period is over, the old plants are chopped back, thrown away (no attention being paid here to the possibility of using green manure), and the cycle repeated. In addition to these ten rows, there were two fields of plum tomatoes, one of which had suffered severe water damage,due to a probable combination of over-watering and early rain, and had died. Tomatoes in the large plot of 30-35m. rows also showed signs of having received too much water for the fruit was splitting before ripening, thus losing its market value except as food for the pigs. The only good marketable tomatoes at this time were in the other field of plum tomato which had reached maturity before the rainy season arrived.

A plantain orchard of some 20 trees lies at the end of the farm and is inter-planted with the vine crops mentioned above. A new field, being prepared for bananas and tomatoes at the far northeast corner, completed the fenced-in area of the farm. A wild purslane (Portulaca sp.), which was growing in abundance in this field, could make an excellent source of fresh salad greens, although its quick acceptance is somewhat unlikely.

A windmill, located in the northwest section of the property just outside the fence, supplies water from the Rio Takutu for irrigation. An assortment of garden hoses, leading in all directions from makeshift storage towers, are used to disperse the water. Primary danger here is over-watering and suffocation, not drought.

Fertilization is accomplished with local materials. Cow manure from a nearby corral is stored wet in a decomposition pit for some six months. It is then mixed with rotted Ité palm fibers in a 70:30 ratio and applied directly to the soils or seed tables. Horse manure is used very sparingly and only for the onion crops. When available, blood and bones were also used as a fertilizer. The blood is used directly and the bones are burned with a wood filler, then crushed, mixed with manure and Ité fiber, and spread over new fields. The fact that water used from the Rio Takutu might add to overall soil fertility should also be considered. The only mechanical aid employed is the temporary use of a tractor to plough new fields. The farm gives the overall appearance of being in excellent condition, with the exception of the previously mentioned plots of tomatoes, and some orange trees in the southwest corner of the orchard which show some signs of nitrogen deficiency. Runoff might well be the most serious problem to be faced, coupled with excessive leaching of the soil.

Fig. 11

Rows of staked tomatoes being harvested at the Melville farm. Note that even though the rows have been slightly mounded sufficient drainage has not been provided (compare with Fig. 8 at Pirara) and this particular crop showed the effects of severe water damage.

CONCLUSION

The extensive preliminary check list gives a false impression of the local diet since, of the 10,000 odd residents of the savannas, over 90% are Amerindians who utilize primarily cassava, plantains, yams, eddoes, sweet potatoes, corn, and rice, plus spices, mangoes, pawpaw, and some sugar cane. As indicated previously, even of this limited plant list, cassava is by far the dominant food crop. It should be also pointed out that the diversity of diet increases as one approaches the larger settlements and villages where Amerindians have contact with ranchers, government employees, and settlers from the coast. With the exception of those Amerindians working on the ranches or living in the Lethem - St. Ignatius area, beef is a relatively scarce item in the diet, whereas fish and wild game are consumed to some extent on a seasonal basis. Several recent papers by personnel of M.U.S.R.P. have dealt in greater detail with the broad area of shifting cultivation (see Waddell, 1963;[7] Dagon, 1967;[8] and Salisbury and Hills, 1967[3]). The variety and use of cultivated food plants can be expected to increase as more outside contact with the Amerindians occurs through the continued growth in size of settlements, which apparently is the current trend, and the movement of more coastal residents into the interior with the subsequent introduction of Asian and European cultivated food species.

The farmers need considerable help in the form of technical information, procurement of seed and fertilizer, and availability of rapid soil analysis (several of these farmers actually have sent their garden soils to universities in the United States for the simple determination of pH and organic content). Irrigation is essential and no garden, regardless of whether it is for home use or a commercial operation, can survive without an adequate well or access to a year-round stream or spring. Chemical control of insect pests is necessary to secure higher yields and in most cases will require greater aid from the local agricultural officer. Elementary practices such as elevated and well-drained seed bed tables, control of excessive water during the rainy season by using raised rows and extensive ditching, the addition of a green manure (legumes included) to the crop cycle, and correct control of run-off and leaching by proper planning, would do much to raise the agricultural quality of these farms and gardens.

There would appear to be little doubt that both the quality and quantity of food plants cultivated in the Rupununi could produce a yield that would make the area self-supporting. However the concept that the savannas are the future garden area of Guyana remains a cruel deceit. As long as the savannas are isolated from the coast, except by air, the market value of any Rupununi garden crop remains of questionable value in spite of the fact that Guyana Airways has recently reduced the air-freight rate on perishable goods. The veritable success of the relatively recent commercial truck farming lies with the individual farmer's interest in the progress of his operation and his ability to accept and procure up-to-date methods and technology suitable to his particular tract.

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13 ABSTRACT

This is the first of the Savanna Research Series to focus its attention on agriculture in the savannas. The fields of the shifting cultivators and the ranch gardens are seen as integral parts of the savanna landscape. A checklist of the species grown at selected locations is presented and certain of the plants discussed. A description is given of the various cultivation site-types from shifting cultivation to the commercial truck-farm. In conclusion the Amerindian need for help in procurement of seed and improved technology is stressed. The Rupununi is stated to have the potential to be self-supporting but never to be a garden-state to supply the rest of Guyana.

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