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Contribution of plant species in homestead farms, to food security and sustainability in Ebonyi state – South eastern Nigeria.

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A three Agricultural Zone (Abakaliki, Afikpo and Ohoazzara) exploratory survey of useful plant species in three compound farms in 12 communities in Ebonyi State of Nigeria was conducted to develop a plant species inventory study so as to assess the contribution of plant species in homestead farm to food security and stability in the State. A total of 156 different plant species including 63 woody plant species (exploited, unexploited and endangered) which yield edible fruits, seeds or vegetables, 36 boundary and live fence plant species and 57 different arable and other field crops (legume, cereal, vegetable, spice, herb) were identified in the 12 communities. These communities were classified into three identifiable settlement patterns: nucleated, isolated and dispersed settlements; and the survey revealed that the three settlement patterns had average number of plant species of 79.8, 88.3 and 80.1 respectively. Fifteen (15) plant species of most considerable value have been seen in all the communities visited. Twelve (12) plant species were considered endangered, having been found only in three communities visited while many plant species not exploited were also observed in all the communities. Study therefore revealed that isolated and dispersed settlement patterns produced the highest plant species that are environmental friendly and conservative and as such should be improved for increase food security and stability.

Key words: Homestead farms, plant species, food security, sustainability.

INTRODUCTION

The demand for food is on the increase globally and scientists have come up with many systems of farming to boost food supply. Food crops are grown either on a large scale under farming conditions or as a small scale in a garden near a home. Compound or homestead farms in several countries of tropical Africa have become an increasingly important sub-system of traditional agricultural farming systems (IITA, 1985; Meregini, 2005).

Homestead or compound farms have been described as multi-layered stands of annual and perennial plants adjoining living houses and managed sometimes with some small livestock, by household labour for food, cash incomes, social and cultural needs of the family, all of which play strategic nutritional roles (Okigbo, 1990; IITA, 1985). Compound farm used interchangeably with homestead farm or home garden refers to similar farm production (Fernandez and Nair, 1990), which are fairly stable agro-ecology systems of varying complexity, help to minimize seasonal periods of food shortages. At the same time, they ensure reasonable levels of productivity for variety of foodstuff with very little or no risk of crop failure (IITA, 1985). Apart from food production as the

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primary function of most compound farms, it constitute also the function of providing fuel wood, timber (Meregini, 1999; Fernando and Nair, 1990), wind breakers, feed (in the form of fodder for livestock) and erosion control measures. Home garden in urban settings provide nutriation and income, often to those most in need and at low cost to the gardener. The gardens are valuable, even indispensable, to many urban households (Vasey, 1990). The plant species (herbaceous, woody and creeping) propagated is always mixed, but the vegetation forms a multi-storeyed canopy, favorably placed to exploit the above and below ground environmental resources at different layers. The multi-storeyed structure and the wide range of species allow almost complete coverage of the soil by the plant residues while refuse obtained from waste of plants and animals are also used in maintaining the soil fertility (Altieri, 2005; Beetz, 2002). The homestead farm is a common practice in Ebonyi State and has been seen to be a vital tool of increasing food supply with less effort and at a reduced cost. Against this background, this survey was carried out to identify and categorize existing woody plants in association with food crops in selected compound farms within the densely and sparsely populated areas in Ebonyi State. It was also aimed at understanding their composition, structure, interactions among components, nutrition, economic and overall socio-cultural importance of compound farms in the communities.

MATERIALS AND METHODS

Location of the study

A three exploratory survey of three Agricultural Zones that make up Ebonyi State of Nigeria was undertaken. Three compounds were visited in each of the 12 randomly selected communities in the three zones (Abakaliki, Afikpo and Ohaozzara) surveyed. Plant species in compound farms in the South-Eastern Nigeria appraisal as outlined by Meregini (1999) were adopted for the survey.

In the areas visited, most homestead farms had mixtures of trees and shrubs (fruits, seeds, leaves, nuts or fire woods), annual crops, many varieties of vegetables and ground covering plants, and these plants are grown together to make the best use of the small space available with small livestock inclusive (mostly free range).

Features of homestead in the study area

In the study areas, some compounds had ranges of 3 - 5 households occupied by the man, his wife/wives, children and others living as subordinates to them, separated by live fence mainly at the backyard. The compound farm comprised both undeveloped and planted-up land by members of the family. The population density in the communities studied ranged from 500 to 2,000 persons per km^2 (Nigerian National Population Commission, 1991) and the land area was dominated by plains 200 m above sea level (Meregini, 1999). The soil is hydromorphic, poorly drained with percentage slope between 1-2% (Lekwa et al., 1995). The soils were characterized by deep porous sandy soils derived from sandy deposits in some zones. The soil in the study area is generally characterized with clayed loam soil that is easily prone to water logging, hard-pan that dries up and caped easily. These zones (Abakaliki and Afikpo) possess red and brown soils derived from sand stones and shale (Unamma et al., 1985).

The vegetation of the area is within the derived savanna of the South-Eastern Nigeria, with a tropical wet and dry climate having annual temperature and rainfall of about 29°C and 13510 mm, respectively (FCAI, 2003; Mbagwu,2001).

The compound farm size ranged from one quarter to slightly less than two hectares. The size of the compound tended to cluster around 20% of the total cultivated farm area (IITA, 1999).

The compound farms in some communities in the area visited were densely located along roads and paths in relation to associated field in the traditional farming system (Figure 1).

Identification guidelines

In the study area, identification of the limits of the compound farms including any fence or boundary planting separating adjoining farm or other fields where applicable were carried out. Identification of the plant species and their utility classes within the compound farms, stratification of the farm to highlight strata with varying percentage of trees, shrubs and annuals (exploited, unexploited and endangered species) crops and recording of the local names, uses of the plants and mode of propagation were carried out. Plant species were identified by a Botanist and Taxonomist working with the Federal College of Agriculture, Ishiagu, Ebonyi State, Nigeria.

RESULTS AND DISCUSSION

Settlement patterns and species distribution

The distribution of compounds and the existence or otherwise of readily identifiable compound farm space for each compound in each community in the study area were grouped under the following settlement pattern:

Nucleated settlement

Compounds and houses, and household lived along roads and paths and houses backing each other with no readily identifiable compound farm space (Figure 1). The entire settlement was surrounded by fruit trees. This agrees with the finding of Meregini (1999) who stated that compounds and houses aggregated back to back with no identifiable farm space for each household; the settlement surrounded by a narrow belt of fruit trees owned by different persons from different household. In this settlement however, it was observed that tree shrubs and agricultural crops were deliberately used for several purposes simultaneously. Adebagbo (2000) describe as multipurpose system farming as where animal inclusions are allowed to graze in the field.

Isolated settlement

Compounds and houses were found separately from one another in compound farms. The compound farms are easily identified as separated by some natural barriers such as valleys, and flood plains. In the shelter of trees and crops, animal can benefit from both the forage

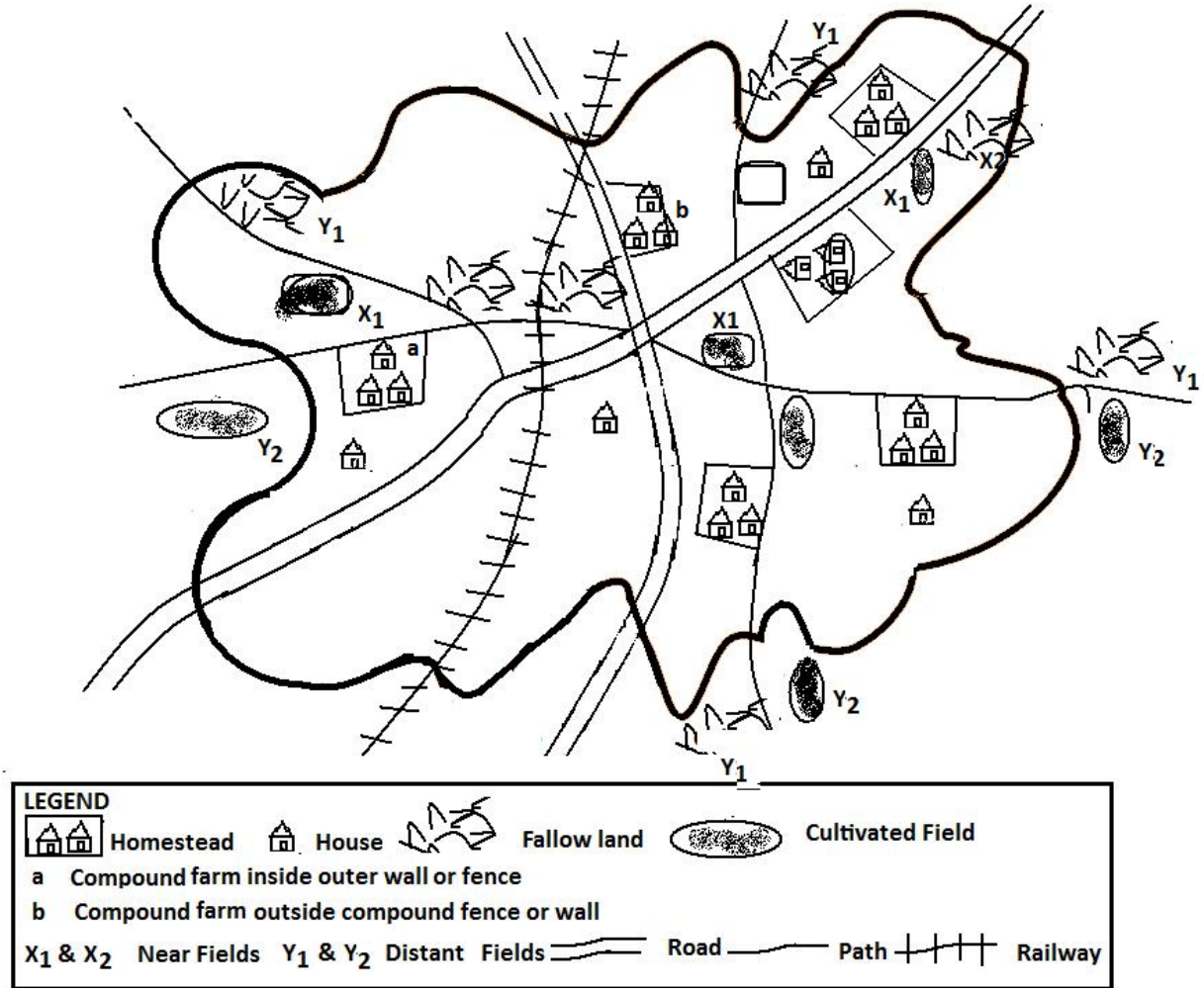

Figure 1. Schematic diagram of compound farms in relation to associated fields in traditional farming systems in Ebonyi state, Nigeria.

production and the protection afforded them by the shade which reduces stress (Adebagbo, 2002; Baumer, 1990).

Dispersed settlement

In the study area, compounds and houses were found in separate places with each compound or household separated from one another by a recognizable compound farm with live or dead fences. In some cases, it was observed that most compounds or household where separated by flood plains where most farms operations are carried out for annual cropping (Figure 1).

Distribution of identified plant species:

The number of the different species of plants identified in the settlement pattern of different communities visited is shown in Table 1. Based on the distribution of compound farms, Afikpo agricultural zone, in both nucleated and dispersed settlement pattern, was observed to produce the highest total plant species (124 and 111 with mean of 31); comprising of woody plant species ranging from 11 - 18, 3 - 5 lives fence species and 11 - 17 food crop species, respectively while Ohoazzara zone produced the lowest total plant species (90 - 99) ranging from 2 - 11 woody plants, 2 - 7 live fence and 9 - 17 arable crop species. However, in isolated settlement pattern identified, Ohoazzara zone produced the highest plant species. (117) ranging from 7 - 18 woody plants, 2 - 8 live fence and 10 - 14 arable crop species, while Afikpo produced the lowest plant species (112) ranging from 9 - 18 woody plants, 2 - 8 live fence, and 10 - 16 arable crop species.

Homestead farming in the study area shows a typical integrated farming system, based upon the technique of agroforestry systems with the woody species interacting temporally and spatially with food (arable) and other crops and livestock.

These trees and shrubs are retained on the farm because of their economic importance such as fruits, fire

Table 1. Identified Species in the Different Settlement Patterns in the three Zones.

Settlement Pattern	Agric Zone	Communities	WPS	LFS	TCS	Total	Mean
Nucleated	Abakaliki	Abomege	12	2	9	105	2.63
		Iboko	11	5	12		
		Ngbo	9	3	10		
		Amagu	15	9	18		
	Afikpo	Oso Edda	18	3	13	124	31
		Amagbara	13	4	11		
		Amaezu	11	5	17		
		Ukpa	13	3	13		
	Ohoazzara	Ishiagu	6	3	13	90	22.5
		Uburu	4	2	9		
		Isu	11	7	10		
		Onicha	8	3	14		
Isolated	Abakaliki	Abomege	6	4	12	114	28.5
		Iboko	12	6	9		
		Ngbo	9	3	10		
		Amagu	17	8	18		
	Afikpo	Oso Edda	9	4	15	112	30.5
		Amagbara	14	2	14		
		Amaezu	18	3	16		
		Ukpa	12	5	10		
	Ohoazzara	Ishiagu	14	2	10	117	21.3
		Uburu	7	6	14		
		Isu	11	4	11		
		Onicha	18	8	12		
Dispersed	Abakaliki	Abomege	3	2	10	110	27.5
		Iboko	8	5	11		
		Ngbo	10	7	14		
		Amagu	15	7	18		
	Afikpo	Oso Edda	12	3	15	111	27.8
		Amagbara	14	2	10		
		Amaezu	9	5	16		
		Ukpa	9	3	13		
	Ohoazzara	Ishiagu	6	2	15	99	24.8
		Uburu	8	5	17		
		Isu	2	5	12		
		Onicha	8	3	16		

WPS = woody plant species; LFS = live fence species; TCS = total crop species.

wood, stakes, fodder, nuts and vegetables. The compound farms practiced in the survey area includes multi-storeyed home gardening and boarder planting. The reason for having different compound farms could be attributed to the need for the provision of variety of foods. This agrees with the report of Mande (2003), Anegbeh et al. (2002) and Ogbu et al. (2007), that agroforestry farming method is used more in food security due to variety of crops obtained and the capacity to boost soil fertility and much needed income. Homestead farm generally had proved to be a system for providing a range of human needs in terms of food, fuel, medicine, and live-

stock feeds (fodder) and in the control of soil erosion and soil fertility.

Various plant species identified in the study area

Homestead farms surveyed in the three Agricultural zones had a total of 156 various plant species. These plant species identified ranged from woody plant species to arable crop species that are planted and/or protected for a variety of purposes in the compound farms. The number of plant species identified in any one compound ranged from 1 to 20 frequency rating, and a core of 20 species were observed at high frequencies on the majority of homestead farms (Table 2). The different woody species are mainly used as food, timber and firewood, some of which are unexploited. Thirty six (36) other different woody plant species used primarily for fence, hedge-grow and boundary demarcation were also identified. Meregini (1999) had earlier identified woody plant species used for fence and boundary demarcation in compound farms in Imo, Abia and Ebonyi State compound gardening. Fifty seven (57) different arable and other field crops including root and tuber crops, legumenous crops, cereals, vegetable species and herbs were identified (Table 2). These species constitutes mostly indigenous species and few exotic species introduced into the farms. Ogbu et al. (2007) and Ekundaiya (2007) had earlier observed that species in compound farms play crucial roles in the culture of most people. Some are taken raw as fruits for refreshment, others as seasoning agents for cooking, and some as supplements in traditional herbal (medicine) preparation. Among the total number of plant species identified, 15 were classified as species of most considerable values because they were observed in all the communities.

Unexploited plant species

Many useful plant species identified in the area were unexploited in some communities visited. These species grow wild and sometimes used as fuel wood for woody species (Table 3). Okpeke (1987) earlier stated that there are many tree species in the tropics which are potentially useful but still remain unknown to the international market and are not exploited. Attention has not been given to these useful plant species to fully utilize their resources. Many compound farmers have known the values of some of the plant species but they do not pay adequate attention to increase and improve on their production. Some of these species occur naturally and are incorporated into the homestead. However, due to inappropriate technique in propagation, lack of knowledge and lack of market demand, less attention is given to the species.

Endangered plant species

The survey conducted revealed other plant species in the communities visited as endangered species (Table 4). Twelve (12) plant species were observed as endangered. Meregini (1999) stated that, these are plant generic resources which could be lost readily if attempts are not made to conserve them. These plant species have potential values but farmers do not have the knowledge of maintaining, multiplying and managing them and as such much attention is not given to these species of plant. This could be as a result of long gestation period, extensive height or size at maturity, non-availability of planting space and lack of knowledge or appropriate propagation technique (Meregini, 1999). The demands for the products from some of the endangered species were observed to be low, and some were lost through deforestation especially those in the wild state. On the other hand, some endangered species and other plant species found in the area visited notwithstanding stand as a mean of halting the vicious cycle of deforestation, soil erosion control and other environmental problems facing the ecological zones of the farming settlements.

Conclusion

Homestead farms in a traditional concept has been modernized to agroforestry systems that integrate crops and/or livestock with trees and shrubs (Beetz 2002), that is associated with continuous availability of a variety of fresh food materials almost all the year round. Homestead farms were seen to be possible, resulting in biological interactions that provide multiple benefits including diversified income sources, increased biological production and improved habitat for both humans and wildlife. The adoption of homestead farm is to increase the economic stability and has been identified to be highly sustainable both in food security and in ecological balance of the environment, through the interaction existing between various plant species, the environment and the livestock.

From the survey, it was observed that a well designed and structured compound farm will increase higher standard of living and food security, and as such policies on settlement scheme will help in self-reliance and food sufficiency production and decent technology on ecological stability, protection and conservation. The distribution and species composition of most of the compound farms visited in the survey are largely comparable with most compound farms in some other parts of the country including Abia, Imo and Anambra States (Meregini, 1999; IITA, 1985; Okigbo, 1990). The analysis of homestead farms revealed the growing adoption of agroforestry among some of the communities with sustained environmental and economic benefits. There is the need to build upon the success stories in the communities in order to minimize the problems of poverty, food insecurity and environmental degradation. The paper offered recommendations based upon education and research, to rehabilitate homestead farms. It is believed that settlement pattern that allows for substantial room for compound farming may be more progressive and sustainable.

Table 2. Plant species of considerable values.

Specie	Common Name	Local Name	FR	PU	PM
Magnifera indica	Mango	Maguru	6	Edible fruit	Seed
*Pterecarpus soyanlon**	Pterecapus*	Oha	15	Edible leaf	stem
Irvingia gabonensis	Bush mango*	Ogbono	9	Edible fruit/seed	Seed
Treculia africana	Bread fruit*	Ukwa	6	Edible seed	Seed
Pentaclethra macrophylla	African oil bean	Ukpaka	4	Edible seed	Seed
Cocus nucifera	Coconut	Akibekee	3	Edible nut	Nut
Elaeis guineensis	Oil palm	Nkwu	6	Edible oil/seed	Kernel/seed
Raphia hockeri	Raphia palm	Ngwo	2	Palm wine	seed
Dicryodes edulis	Native pear/bush butter	Ube	9	Edible fruit	seed
Dennettia tripetala	Pepper fruit	Mmimi	1	Edible fruit/seed	Seed
Carica papaya	Pawpaw	Mgbimgbi/Okwuru bekee	20	Edible fruit	seed
*Citrus sinensis**	Orange*	Oroma/Epe	10	Edible fruit	seed
Cola nitida	Cola	Oji	3	Edible seed	Seed
Musa Spp AAA	Banana	Unene	9	Edible fruit	Sucker
Musa Spp AAB	Plantain	Jiloko/Abrika	7	Edible fruit	Sucker
Psidium quajava	Guava	Gwova	3	Edible fruit	Seed
Afzelia africana	Mahorgamy	Akparata	5	Edible seed	Seed
Baffia nitida	Baffia	-	8	Live fence	Stem cutting
Langenaria sinceraria	Calabash	Akpuroba	3	Live fence /pot	Stem cutting/seed
Jatropha curcas	Jatropha/Physic nut	-	10	Live fence	Stem cutting
Markhamia tomentosa	-	Okeogirisi	7	Live fence	Stem cutting
Newbouldia laevis	-	Ogirisi	9	Live fence	Stem cutting
-	-	Nmingina	3	Live fence	Stem cutting
Spondia mombin	Plum tree	Ijikara	10	Live fence	Stem
*Oryza sativa**	Rice	Osikapa	20	Edible grain	Seed
*Abelmoschus escuentus**	Okra	Okwuru	20	Edible fruit	Seed
Allium cepa	Onion	Ayabasa	6	Edible bulb	Bulb
Allium sativum	Garlic	Ayabasa oyibo	1	Edible Leaf/bulb	Bulb
*Vernonia anygdalina**	Bitter leaf	olugbu	8	Edible leaf	Stem cutting
Amaranthus hybridus	Green	Inine	7	Edible leaf	Stem cutting
Talinum triangulare	Waterleaf	-	1	Edible leaf	Stem cutting
*Telfairia occidentalis**	Fluted pumpkin	Ugu	10	Edible Leaf/Seed	Seed
*Cucurbita maxima**	Pumpkin	-	5	Edible Leaf/Fruit	Seed
Solanum melongena	Egg plant	Aghara	7	Edible Leaf/Fruit	Seed
Ricinus communis	Castor oil	Ogiri	7	Edible Seed/Oil	Seed
*Zea mays**	Maize	Oka	10	Edible seed	Seed
Cola pachycarpa	Monkey cola	Achicha	1	Edible fruit	Seed
Colocasia esculentus	Cocoyam	Ede ofe	7	Edible corm	Corm /cormel
*Dioscorea rotunda**	White yam	Jiocha	10	Edible stem	Stem tuber

FR = Frequency rating; PU = part used; * most considerable value; Pm = propagation material.

Table 3. Unexploited/Low rating plant species.

Specie	Common Name	Local Name	FR	PU	Status
Coula edulis	Tree walnut	Udi	1	Edible seed	B
Brachystegia eurycoma	Bay plant	Achi	2	Edible seed*	W
Dennettia tripetala	Pepper fruit	Mmimi	1	Edible fruit/seed	C
Buchozia carnacea	-	Uke	1	Edible seed*	W
Cola lepidota	Monkey cola	Ochicha	2	Edible fruit	B
Garcinia cola	Bitter cola	Akilu	2	Edible seed	B
Pleukcentia conopohora	Climbing walnut	Ukpa	1	Edible seed	B
Aframomum melegueta	Alligator pepper	Ose oji	2	Edible seed	B
Piper guineense	Black pepper	Uziza	2	Edible leaf/seed	W1
Murraya koenigii	Curry leaf	Curry	2	Edible leaf	C1
Phaseolus vulgaris	Beans	Akidi	2	Edible leaf/seed	C
Ricinus communis	Castor oil	Ogiri	2	Edible seed	C1
Mucuna sloanei	Horse eye bean	Okobo/Ukpo		Edible seed	B2
Ocimum viride	Basil leaf	Nchonwu		Edible leaf	C1
Arachis hypogaea	Groundnut	Ahuekere		Edible seed	C

Fr = Frequency rating; PU = Part used; Status:B, Both; C = Cultivated; W2 , Wild; 1 = used as seasoners; 2 = used as thickeners.

Table 4. Endangered plant species.

Specie	Common Name	Local Name	PU	Status
Gnetum africana	Gnetum	Ugazi	Edible leaf	W
Gongronema latifollium	Clove	Utazi	Edible leaf	W1
Pergularia doemia	African flavour	Osirisa	Edible leaf	W1
Afzelia africana	Mahorgany	Akparata	Edible seed	W2
Brachystegia eurycoma	Bay plant	Achi	Edible seed	W2
Detorium microcapum	-	Ofor	Edible seed	W2
Parkia biglobosa	Locust bean	Ogiriokpi	Edible seed	W1
Alchonea laxiflora	-	-	Edible leaf	W1
Tetrapleura tetrapthera	-	Uhokiriho	Edible pod	W1
Heinsia pulchella	Bush apple	-	Edible seed	W
Heinsia cryneta	-	-	Edible leaf	W
Hidelgardia barteri	Parachute plant	Utuku	Live fence	W
Cola lepidola	Monkey cola	Ochichaoche	Edible fruit	W
Cola pochycerpa	Money cola	Ochicha odo	Edible fruit	W

PU = Principal use/uses; W = wild ;1 = used mostly as seasoner ; 2 = used mostly as thickeners.

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