

## **AGRICULTURE**

This refers to the growing of crops and rearing of animals for subsistence and commercial purposes. Agriculture is the most important land use in Uganda.

### **CURRENT STATUS**

- ✓ Agriculture is the backbone of Uganda's economy characterised by subsistence farmers who still plant crops for home consumption.
- ✓ The 2014 National housing and population census showed 72% of Ugandans survive on agriculture for a living.
- ✓ 69% of the total population depends on small holder subsistence farming.
- ✓ It generates about 85% of foreign exchange earnings.
- ✓ The agricultural sector currently contributes about 20 percent of the total Gross Domestic Product.
- ✓ Uganda's agricultural system remains largely rain fed.
- ✓ Commercial agriculture is dominated by foreign farmers.
- ✓ Dominated by use of rudimentally and obsolete technologies and methodologies.
- ✓ In recent years, the government has tried to diversify agriculture and there is emphasis on non-traditional export crops such as Vanilla, Simsim, Soya bean, Beans and maize.

### **CHARACTERISTICS OF UGANDA'S AGRICULTURAL SECTOR**

- ✓ It is characterised by subsistence farming farmers who still plant crops and rear livestock mainly for home consumption. It is only the surplus that is sold.
- ✓ The farming activities are mainly based on family labour.
- ✓ There is limited large scale farming or commercial farming such as plantation farming and dairy farming.
- ✓ Uganda's agricultural system mainly depends on physical factors like it is extensively rain fed and limited use of scientific methods.
- ✓ Commercial agriculture is dominated by foreigners.
- ✓ Dominated by use of traditional/rudimentally and obsolete technologies and methodologies due to limited capital.
- ✓ The agricultural farms are generally small and individually owned.
- ✓ There is diversification of crop production (intercropping) and animal husbandry like production of a variety of food crops and cash crops.
- ✓ It also characterised by limited research in crop growing and animal rearing.

### **AGRARIAN (AGRICULTURAL) SYSTEMS IN UGANDA**

A system involves a combination of crops grown and the type of animals reared. It includes the seasonality of cropping, scale of operation, intensity of production and techniques of land management.

Various agricultural (agrarian) systems have been categorized into farming practice depending on the suitability of the environment and cultural attachments.

Agrarian systems therefore refer to the agricultural practices carried out by a particular group of people in a specific area, depending on the suitability of the environment and cultural attachment i.e. based on soils, topography, climatic conditions and major crops grown. They are broad generalized demarcations which help in understanding agriculture diversity. They have been categorized into the following systems:

Intensive-banana-coffee-Lake shore system in areas such as Mukono, Mubende, Mityana, Luwero, Kayunga, Iganga, Bugiri, Mayuge, Kampala, Wakiso, Masaka, Buikwe, Buvuma and Ssesse islands.

Banana-millet-cotton system found in areas like Masindi, Hoima, Buyende, Tororo, Butaleja, Pallisa, Kaliro, Namutumba, North Kamuli, Kayunga and Nakaseke.

Western-banana-coffee-cattle system in Bushenyi, Ibanda, Rukungiri, Ntungamo, Isingiro, Mbarara, parts of Mubende, Kiboga, Kibale, Masindi and Hoima.

Medium-altitude-intensive-banana-coffee system found in the districts of Mbale, Sironko, Manafwa Bundibugyo, Kabarole and Nebbi.

Montane system found in areas like Mbale, Kapchorwa, Kabale, Kisoro, Rukungiri, Rubanda, Kapchorwa, Bukwo, Bududa, Manafwa and Sironko.

Annual cropping and cattle (Teso) system evident in the districts of Kaberamaido, Katakwi, Kumi, Soroti, Kumi, Amuria and Bukedea.

Annual cropping and cattle northern system found in areas of Dokolo, Lira, Apac, Oyam, Amolator and, Amuru, Gulu, Pader and Kitgum.

Annual cropping and cattle West Nile farming system in the districts of Nebbi, Arua, Maracha, Koboko, Packwach, Yumbe, Moyo and Adjumani.

Pastoral and annual crop system in some parts of Rakai and Masaka, Kiruhura, Isingiro, Moroto, Abim, Kaabong, Kotido and Nakapiripirit districts

See figure 12:1

### SKETCH MAP SHOWING THE AGRARIAN SYSTEMS/ AGRO-ECOLOGICAL ZONES

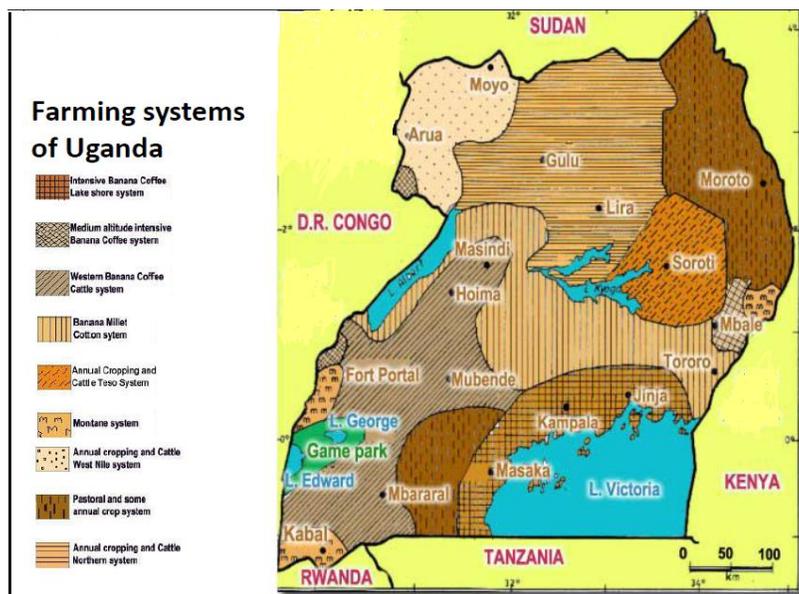


Fig 12:1

## **INTENSIVE BANANA COFFEE LAKE SHORE SYSTEM**

This system covers the Lake Victoria Fertile Crescent in areas like the Northern and North western shores of Lake Victoria such as Mukono, Mubende, Mityana, Luwero, South Kamuli, Iganga, Bugiri, Mayuge, Kampala, Wakiso, Masaka, Buvuma and Ssesse islands. This region has Bi-modal rainfall regime or double maxima. The rainfall is evenly distributed ranging from 1000mm to 1500mm annually. The soils are of medium to high productivity. They are basically ferralitic (ferrasols). The relief is characterized by flat topped hills, long and broad gentle slopes and wide valleys with extensive papyrus. These are mostly ferralitic (ferrasols) soils and some of which are fertile friable clays. The fertile hydromorphic alluvial soils of moderate productivity, and heavy rainfall ranging from 1000mm to 1500mm and over 2225mm per annum in Ssesse islands encourage growing of perennial crops like robusta coffee, banana, tea, sugarcane oil palm. This explains why most of the plantations are found in this system, for instance sugarcane plantations at Lugazi and Luwala estates in Buikwe, Tea Estates in Mityana, oil palm growing in the islands of Ssesse (Bugala).

### **CHARACTERISTICS OF INTENSIVE-BANANA-COFFEE LAKE SHORE SYSTEM**

- ✓ The main food crop grown is bananas and other food crops are beans, cassava, maize, etc.
- ✓ The major cash crop grown is robusta coffee and other cash crops are tea, oil palm, sugarcane and cocoa.
- ✓ There is keeping of animals along side crop growing to enable production of crops and animal products for self sufficiency.
- ✓ Exotic breeds of livestock have been introduced for dairy purposes.
- ✓ The land tenure system is different from elsewhere in the country which much of the land being held as free holding with registered titles (mailo).
- ✓ Mainly rely on family labour and hired labour.
- ✓ There is growing of perennial crops like coffee, tea, sugarcane and oil palm.
- ✓ There is also growing of annual crops such as beans, maize, etc.
- ✓ There are permanent settlements.
- ✓ Labour intensive techniques of production are used.
- ✓ There is intensive use of manures and crop residues to increase soil fertility.
- ✓ Intensive use of the land represented by intercropping of both annual and perennial crops.
- ✓ Each small holder grows both food crops and cash crops.
- ✓ Most of the agricultural activities are on the small holdings owned by individual farmers.
- ✓ The marketing system is dominated by middlemen who pay very little to the farmers.
- ✓ Dominated by use of simple tools like hoes, pangas and slashers.
- ✓ Plantation farming is carried out like sugarcane growing at Kakira and Oil palm growing in Kalangala. These is capital intensive.
- ✓ The farmers sell at road side markets and trading centres, towns and institutions.
- ✓ Plantation crops are processed for export and some are sold locally.
- ✓ Small holders grow plantation crops like outgrowers for sugarcanes. Tea, etc

### **MEDIUM ALTITUDE INTENSIVE BANANA -COFFEE -SYSTEM**

This system is found in regions with medium altitude, particularly adjacent to mountain regions in the districts of Mbale, Sironko, Manafwa Bundibugyo, Kabarole and Nebbi. These areas receive heavy rainfall of over 1800mm per annum. They also have fertile volcanic soils of medium to high productivity. These favour the growing of perennial crops like Arabica coffee and bananas. Mechanization is hindered due to the rugged landscape. They also have loptosols which are skeletal soils on steep terrain unsuitable for crop growing but have a potential for extensive grazing. Bennek in Kapchorwa is an area with moderate productivity as are parts of Mbale like Babutu on the medium altitudes of highlands are clayey loams with high humus content.

## **WESTERN BANANA-COFFEE- CATTLE SYSTEM**

The relief is hilly with steep slopes in some areas. The dominant soils are highly-weathered ferralitic soils and sandy loams with some sandy clay loams. These are soils of moderate productivity especially in Bushenyi, Ibanda and Bwamba. This system is practiced in Bushenyi, Rukungiri, Kabale, Ibanda, Kiruhura, Ntungamo, Isingiro, Mbarara, parts of Mubende, Kiboga, Kibale, Masindi and Hoima. These are areas practicing growing of Arabica coffee and bananas. Livestock rearing is also a common economic activity both on small and large scale with ranches such as Ssinga, Nyabushozi. There are some areas with soils of fair productivity, for example sandy loam soils in Isingiro, Mbarara and Hoima. These soils support both perennial and annual crops including cotton and tobacco.

## **BANANA-MILLET-COTTON SYSTEM**

This system is found in parts of Masindi and Hoima, Buyende, Tororo, Butaleja, Pallisa, Kaliro, Namutumba, North Kamuli, Kayunga, Nakaseke and Nakasongola. The intensive banana-coffee system gradually modifies into the banana-millet-cotton system towards the drier boundaries. It is dominated by growing of millet, cotton and bananas although livestock rearing also occurs in this system. The region receives moderate rainfall ranging from 750mm to 1000mm per annum. Rainfall is less stable than for intensive banana coffee system. So there is greater reliance on annual food crops like millet, sorghum and maize. Livestock is the main activity in the drier areas like Nakasongola. Most of the areas in this region have soils of fair productivity as seen in Mubende, Kamuli, Nakasongola and Luwero.

## **ANNUAL CROPPING AND CATTLE (TESO) SYSTEM**

This covers districts of Kaberamaido, Katakwi, Soroti, Kumi, Amuria and Bukedea. The system has for long been a unique one for its use of ox-plough technology. This has been favoured by flat relief, light soils, sparse population, a large number of livestock and sparse nature of vegetation. It is characterised by bi-modal rain falling on sandy-loams with medium to low fertility soils. Main staple foods are cassava, millet and maize. There is short grassland ideal for livestock grazing. The main food crop is finger millet and other subsidiary crops are sweet potatoes, cassava, oil seed crops like ground nuts, simsim, cotton, sorghum and sunflower are also grown. Intercropping is not a common practice in the area except millet, is at times grown together with maize and pigeon peas. Soils not rich in manganese especially in Katakwi and Soroti are used for ground nut growing. The use of phosphate fertilizers in such areas to raise the fertility of the soils enables arable farming and growth of luxuriant grass legumes to support improved beef cattle. The area receives a mono-modal rainfall regime on sandy loams of medium to low productivity. The dry season is longer extending from December to March. There are short grasslands which are ideal for livestock grazing. Mixed farming is also practised.

## **PASTORAL AND ANNUAL CROP SYSTEM**

This system is found in some parts of Rakai and Masaka, in Kiruhura, Isingiro, Moroto, Abim, Kaabong, Kotido and Nakapiripirit districts. The pastoral communities in Uganda are mainly Bahima and Karamojongs. The annual rainfall is less than 750mm. There is high rates of evaporation leading to low water balance in the soil. It is characterized by hot temperature of over 28°C. This system generally has soils of low productivity like peat to loam soils in Kadam, stony loam in Kazo, Sandy loam in Kidepo. The Karamoja region has sandy clay loams and black clays with very low productivity.

## **CHARACTERISTICS OF THE SYSTEM**

- ✓ Overdependence on animal products i.e keeping of cattle as the major source of livelihood.
- ✓ Short term and drought resistant crops such as millet, beans, simsim and sorghum are grown
- ✓ Nomadic pastoralists move from place to place with their herds in search of adequate water and fresh grass.

- ✓ Communal ownership of land and communal grazing is practiced.
- ✓ Annual bush burning to regenerate fresh pastures is a common feature.
- ✓ Mixed herds of cattle, sheep and goats are common.
- ✓ Local breeds of livestock like Zebu cattle in Karamoja and Ankole cattle in Kiruhura and Mbarara are kept
- ✓ Temporary shelters are usually constructed.
- ✓ It is dependant on natural conditions such as rains and communal natural pasture.
- ✓ There is use of rudimentary methods/tools.
- ✓ Animal products are usually exchanged with food crops.
- ✓ Large pieces are used for animal rearing.
- ✓ The grazing land is characterized by poor quality pastures due to prolonged drought and over grazing.
- ✓ Animals and crops are kept and grown specifically for subsistence.
- ✓ It is dominated by cattle keeping where numbers are preferred to quality.

### **ANNUAL CROPPING AND CATTLE NORTHERN SYSTEM**

This system covers districts of Lango such as Dokolo, Lira, Apac, Oyam and Amolator and, districts in the Acholi-sub region like Amuru, Gulu, Pader and Kitgum. Mono-modal annual rainfall of 1000-2000 mm per annum is received. The system has a monomodal rainfall regime. Rainfall in this area is less pronounced with about 800mm annually. The ferruginous soils in Gulu district are less productive. They are light and therefore more susceptible to leaching. This system has soils of fair productivity as seen in Lira, Apac and East Central Gulu. The alluvial soils are common in the Pager valley.

### **CHARACTERISTICS OF THE SYSTEM**

- ✓ Food crops are stored in granaries so that there is food throughout the year and less pest destruction of cereals.
- ✓ The domestic animals are kept on a small scale for instance cattle, goats and sheep.
- ✓ The region is characterized by short grassland.
- ✓ Livestock grazing is communal with semi nomadic cattle herding.
- ✓ The main cash crops include cotton and tobacco while others are sunflowers and simsim
- ✓ The major food crops are peas, millet, simsim, sorghum and cassava.
- ✓ Intercropping is common and ox-plough technology is less common towards the north.

### **MONTANE SYSTEM**

This system mainly covers mountain and highland areas of Uganda. It is found at high elevations between 1500-1750metres above sea level. It has higher elevation with cool weather, heavy effective rainfall and cloud cover. It also has high population density with smaller sized holdings. Bananas are a major staple crop as well as sweet potatoes, cassava and Irish potatoes. Arabica coffee is prevalent above 1600 metres. This zone is found in Mbale, Kapchorwa, Kabale, Kisoro, Rukungiri and Rubanda. The Kigezi Afro-montane comprises land over 1800m above sea level in Kabale, Kisoro and Northern slopes of Muhavura highlands. It is found at high elevations around Mt. Rwenzori in the districts of Kasese and on Mt. Elgon especially in Kapchorwa, Bukwo, Bududa, Manafwa and Sironko. The system receives heavy, unreliable rainfall and dense cloud cover. Rainfall is over 1500mm per annum. Temperature is low which has encouraged growing of crops such as arabica coffee, wheat, barley and pyrethrum. It has also encouraged dairy farming as seen at Beatrice's dairy farm in Kabale. The area is covered by volcanic soils which are ferrisols or eutrophic in nature especially in Kisoro, Mbale. They have a high agricultural potential with soil of high productivity and therefore support a variety of crops.

## **CHARACTERISTICS OF MONTANE SYSTEM**

- ✓ It is found in highland areas of Mbale, Kapchorwa, Kabale, Kisoro, Rukiga, Bududa, Nebbi, Buhweju, Rukungiri and Rubanda.
- ✓ The crops grown include: bananas, Arabica coffee, barley, wheat, Irish potatoes, vegetables, etc.
- ✓ Bananas are the main food crop grown in the system.
- ✓ Arabica coffee is the chief cash crop grown.
- ✓ Intercropping involving cultivation of a wide variety of crops is common.
- ✓ Crops are grown on terraced landscape.
- ✓ Anti-erosion bunds along contours are common practices.
- ✓ Animals are herded and grazing occurs on marginal hill sides, valley bottoms and road sides.
- ✓ Cattle rearing are done under zero grazing and dairy farming.
- ✓ Commercial farming is more pronounced
- ✓ There is private ownership of land.

## **ANNUAL CROPPING AND CATTLE WEST NILE FARMING SYSTEM**

This is a modification of the Northern system due to climate and different customs. It covers the districts of Nebbi, Arua, Maracha, Koboko, Yumbe, Moyo and Adjumani. In this system, the acreage of cassava often exceeds that of finger millet. The main cash crops are tobacco and cotton. Other crops grown are sorghum, ground nuts, cowpeas and maize. Intensive, mixed and double cropping is commonly practiced. Panjukur in Nebbi district is an area of high crop production. Rainfall patterns are similar to the northern system with greater rain at higher elevation. Intercropping is common with a wide variety of crops. The system is in the sub-humid zone and livestock activities are limited by the presence of the tsetse fly.

### **CHARACTERISTICS**

- ✓ Cotton and tobacco are the major cash crops grown.
- ✓ It is practiced in West Nile in the districts of Nebbi, Moyo, Koboko, Yumbe, Zombo, Maracha, Pakwach and Adjuman.
- ✓ Animal rearing is scattered all over the region.
- ✓ The crops grown include: millet, simsim, cassava, cotton, Arabica coffee, etc.
- ✓ Tobacco is the chief cash crop.
- ✓ Cassava and millet are the major crops grown.
- ✓ Crops are grown on rotationa basis.
- ✓ Crops are grown relatively on flatlands.
- ✓ There is use of simple tools like hand hoe in crop production
- ✓ It is dominated by small scale farms.
- ✓ There is use of firewood for tobacco curling.

## **FACTORS INFLUENCING AGRARIAN SYSTEMS/ PRACTICES**

Agricultural activities are diverse in Uganda as shown by different agricultural systems (practices). The diverse nature of agriculture is a reflection of the following factors.

**CLIMATE:** Climate influences agrarian systems in Uganda in the following ways.

Areas with equatorial type of climate receive heavy rainfall of over 1500mm per annum. The region receives double maxima or bimodal rainfall pattern usually in April and October that is well distributed throughout the year leads to the growth of perennial crops like bananas and coffee resulting into intensive banana-coffee system in Mukono, Masaka, Wakiso and Kayunga districts.

Areas with tropical climate receive moderate rainfall of between 750mm and 1500mm per annum leading to the growth of seasonal crops like sorghum, millet alongside rearing of cattle leading to the Teso system in Kumi, Soroti and Kaberamaido and northern cereal-cattle system in Gulu, Lira and Kitgum.

Areas with montane climate receive heavy relief rainfall throughout the year which encourages the growth of Arabica coffee and bananas resulting into medium altitude intensive banana-coffee system and montane system in areas like Mbale, Bulambuli, Bundibugyo and Kisoro.

Areas with semi-desert climate receive low and unreliable rainfall of less than 500mm per annum encourages growth drought resistant crops like sorghum, simsim and nomadic pastoralism leading pastoral system in Abim, Nabilatuk, Kiruhura, Isingiro, Rakai, Kaabong, Kotido and Moroto.

The tropical climate characterized by moderate rainfall received in areas such as Masindi, parts of Hoima, Kamuli, Mubende, Ibanda, Bushenyi, Gulu, Kitgum, Katakwi, Soroti result into the growing perennial crops such as bananas and arabica coffee lead to western banana-coffee-cattle system and growing of millet, cotton, tobacco leading to banana-millet- cotton system as well as the growing of simsim, finger-millet and cotton, as reflected in the Northern and cattle Teso system.

The Teso system in areas like Kumi, Bukedea, Ngora and Soroti has been supported by tropical climate characterized by mono-modal moderate rainfall above 760mm per annum which is fairly reliable. This has supported the growth of crops like cotton as the major cash crop and food crops like millet, potatoes and maize. Annual crops are grown because of a single rainfall peak.

The West Nile system in areas like Arua, Nebbi and Koboko is supported by tropical climate characterized by moderate and fairly distributed rainfall that supports the growth of tobacco, coffee, ground nuts and cassava.

The Northern system in areas like Gulu, Lira, Kitgum and Apac is supported by fairly reliable rainfall slightly above 760mm per annum which supports the growth of annual crops such as cotton, sunflower, ground nuts, millet and simsim.

**NB:** Rainfall determines the agricultural practices depending on its distribution, reliability and seasonality, effectiveness and intensity.

Temperature also influences agricultural systems and activities as seen below:

It encourages pests and diseases and this prohibits different agrarian systems in Uganda. This partly explains why Arabica coffee is grown in highland areas of Uganda hence the montane system while Robusta coffee is found in the plateau areas where temperature is hot hence the intensive banana-coffee system in the districts of Jinja, Wakiso and Mukono.

There are temperature differences in Uganda, for example, temperature in the Lake Victoria basin generally varies from 20°C to 30°C. Such conditions have favoured the growth of perennial crops such as bananas, Robusta coffee, tea, sugarcane hence the intensive banana-coffee system in areas like Mukono, Wakiso and Jinja.

Mountainous and highland areas experience cool temperature. This has encouraged the growth of crops which do well under such conditions like pyrethrum, vegetables, wheat, barley, Arabica coffee in Mbale, Sironko and Manafwa around Mt. Elgon, Kisoro, Kabale around Virunga, Nebbi, Kabarole, Kasese, Bundibugyo hence the montane system and the medium attitude intensive banana coffee system.

Livestock are also affected by temperature, for example, when temperature is high; animals like cattle feed less, which reduces milk production especially for the exotic dairy breeds. This explains why dairy

farming thrives well at Beatrice's dairy farm and many parts surrounding Kabale town due to cool temperature hence the montane system.

The dry areas of Uganda experience hot temperature with low cloud cover and poor pasture. This has compelled people in dry areas such as Kotido, Moroto and the Ankole-Masaka dry corridor to plant drought resistant crops such as sorghum, simsim.

There is also rearing of local breeds of cattle which with stand harsh climate in form of hot temperature like the Ankole-long horned cattle in Kiruhura and Isingiro and Zebu-short horned cattle in Kaabong, Abim, Kotido and Moroto. This has given rise to pastoral system.

**SOIL:** Soil refers to the weathered and fragmented outer layer of the earth's terrestrial surface.

**SOIL PRODUCTIVITY** refers to the capacity of the soil to support continuous crop growth. In terms of productivity Ugandan's soils can be divided into six categories i.e. soils of high to very high productivity, areas with volcanic activity and alluvial (8%), soils of moderate productivity found in Eastern and Western Uganda except when they are sandy loams (14%), for instance Bennet in Kapchorwa, Namalu in Kotido.

Soils of fair productivity occupy the largest area (43%) of the total land surface in Northern and Western rift valley. Soils of negligible productivity are found in flat valley bottoms. They are basically hydromorphic soils acid soils. They occupy 3% of the total land area as seen in areas like Mubende with red or yellow loams, Sangobay with Green and brown sand.

Soils of Nil productivity occur as skeletal soils. They cover 2% of the total land area and are associated with flat valley bottoms and flood plains. They are soils which are permanently non-productive.

**Soil types have influenced agrarian systems in the following ways:**

Rich volcanic soils like those of Mt. Elgon slopes and Mufumbira ranges have high productivity supporting the growth of crops such as Arabica coffee, bananas, pyrethrum, wheat, Irish potatoes, carrots and peas. Dairy farming is also carried out hence the montane and medium altitude intensive banana coffee system. This is evident in Kabale, Bushenyi, Mbale, Sironko, and Bududa

The Lake Victoria Fertile Crescent has alluvial soils which are of high productivity with ferralitic clay loams. These support the growing of perennial crops such as sugarcane growing at Lugazi, Kakira, Tea growing in Mityana, Kasaku, growing of robusta coffee as well as bananas hence the intensive banana-coffee system.

The acidic loam soils of central Uganda in areas such as Kalangala and Buvuma have supported the growing of cocoa and oil palm.

The Karamoja region in areas such as Moroto, Abim and Kotido, have sandy clay loams and black clay soils of low productivity, These support the growth of pasture suitable for animal rearing and growing of crops such as sorghum hence the pastoral system. They have ferruginous dryland soils ranging from light-red to brown.

Sandy loams. They are of old intensively weathered volcanic ash and cinder. There is limited soil moisture which favours the growth of pasture hence the pastoral system.

The Northern and Eastern cotton-cereal-cattle system are favoured by soils of medium productivity. The soils are light sandy loams which support the use of ox-cultivation and animal grazing in areas like Kumi, Soroti, Serere, Gulu and Lira.

Soils of moderate productivity in Masindi, Luwero and Mityana have favoured the growing of some perennial crops like Banana. It favours cotton and millet growing hence banana-cotton-millet system.

The soils in the Teso region are light and sandy with moderate fertility. This has supported the growing of annual crops like cassava, millet, and sweet potatoes as well as grazing of cattle in Katakwi, Amuria, Ngora, etc.

The West Nile System has sandy soils with low productivity/fertility in areas like Nebbi, Koboko and Arua hence enabling the growing of Arabica coffee, Tobacco, Cassava and cereals. .

Hydromorphic soils found in the valley floors favour the growing of water loving crops such as rice growing in Kibimba and Doho as well as vegetable growing in Kabale and Rubanda.

The Northern and Teso systems are supported by light sandy loam soils, with low to medium fertility and are suitable for ox-ploughing and communal pastures in areas like Gulu, Lira, Soroti and Lira.

**DRAINAGE:** This affects agricultural systems in the following ways:

Well drained areas support the growth of a wide variety of crops such as bananas, tea and coffee as seen in the intensive-banana- coffee system in Jinja, Masaka and Mukono. The well drained areas in Northern Uganda have favoured cotton growing, tobacco and simsim as well as communal grazing in Lira, Dokolo and Apac hence the annual crop and Northern system.

Poorly drained areas support the growth of crops such as rice in areas like Kibimba and Doho, sugarcane at Lugazi and Kakira leading to intensive-banana-coffee system. Poorly drained areas limit agricultural mechanization in areas like Kayunga, Pallisa and Butaleja in the Banana-Cotton-Millet system.

**ALTITUDE:** Temperature tends to decrease with increase in altitude at a rate of 0.6°C for every 1000 metres of ascent. Crops such as arabica coffee in Bundibugyo on the slopes of Mt. Rwenzori, wheat, barley in Kapchorwa, pyrethrum and Irish potatoes in Kabale and Kisoro which require low temperatures are grown in high altitude areas. The cool temperature have also encouraged the establishment of dairy farms like Beatrice's dairy farm in Kabale hence the montane system.

There are some crops which do well in low latitudes where temperature is hot, for instance, robusta coffee in the Lake Victoria Fertile Crescent areas like Wakiso and Masaka promote the intensive banana-coffee system, maize cotton, finger millet and cassava in places like Kumi, Soroti and Gulu hence promoting the Teso and Northern Systems.

Altitude also influences rainfall in the mountainous areas such as Mt. Rwenzori and Mt. Elgon. Highlands such as Kigezi highland do contribute to rainfall formation and as such receive heavy rainfall of over 1500mm per annum thereby supporting the growth of perennial crops such as Arabica coffee and bananas leading to montane and medium altitude intensive banana-coffee system in areas of Kabale and Mbale.

**RELIEF:** The nature of landscape also influences agrarian practices by influencing soil types, drainage and mechanization.

Mountains and highlands such as Bududa and Sironko around Mt. Elgon, Kisoro and Kabale in the Kigezi highlands and Nebbi in West Nile highlands have given rise to fertile volcanic soils which encourage the growth of crops such as Arabica coffee and bananas facilitating montane, Western-banana-coffee-cattle systems and West-Nile system. The upper slopes of mountains are used for livestock grazing.

Relief also determines the tools and techniques used by farmers in their agricultural activities. Mechanization is limited in many parts of Kabale, Bundibugyo, Kisoro, Kapchorwa, Sironko and Bukwo, due to the rugged nature of land while the existence of flat lands in Teso region has enabled the

use of ox-ploughs hence the Teso system. Ox plough use is limited in Buganda region partly because of the rugged relief of some areas. It has also resulted into terracing of the hilly areas especially in Kisoro, Rubanda and Kabale so as to control soil erosion.

Lowland regions experience hot temperature, high evaporation rates, low cloud cover and receive low and unreliable rainfall as observed in Ntoroko, Kasese and Buliisa. This has resulted into irrigation in places such areas Mubuku irrigation scheme. The poor vegetation has given rise to pastoralism among people like the Batuku and Bagungu pastoralists in Ntoroko and Buliisa. Plateau land receives moderate rainfall which has promoted the growth of seasonal crops like millet, sorghum leading to Teso system in Kumi, Soroti and Kaberaido.

It determines drainage in that the valleys are water logged hence crops are grown in wet alluvial soils like rice growing at Kibimba in Bugiri, Doho rice growing in Butaleja. Various parts of Iganga, Mukono and Jinja are used for growing of water-loving crops such as sugarcane at Kakira, Lugazi and Cocoa yams along the edges of streams and wetlands like Nakivubo swamp.

Relief also determines the formation of rainfall. Mountaneous and highland areas such as Mt. Elgon, Mt. Rwenzori, Virungas and Kigezi highlands receive reliable relief rainfall thereby encouraging the growing of perennial crops such as Arabica coffee and bananas hence the montane system. However, they have also tantamounted into aridity on the leeward side. This explains why there is irrigation of Mubuku because it is in the rain shadow of Mt. Rwenzori. The dry areas are also used for animal grazing. It determines the type of crop to be grown, for example, in highland areas such as Kabale, Kisoro, Mbale and Bududa, crops like Arabica coffee, vegetables, wheat and Irish potatoes due to high altitude hence the montane system.

**BIOTIC FACTORS:** These determine the distribution of farming practices since they permit or prohibit certain forms of agriculture in the following ways:

The existence of tsetse flies in some parts of Mayuge (Bunya County) limited the intensive-banana-coffee system. Tsetsefly infestation in Masindi limits agricultural activities.

In some parts of the country like Luwero, Kumi and Bukadea, agriculture production is limited by the outbreak of cassava mosaic, trypanosomiasis causing Nagana and East coast fever is a problem to pastoral areas like Kaabong and Moroto.

Diseases such as sleeping sickness in Mayuge, AIDS scourge in Rakai affected human settlement and consequently human population. This has affected the quantity and quality of agriculture production.

**VEGETATION:** Vegetation cover greatly influences land use planning in that areas with dense vegetation like forests are associated with heavy rainfall which favour the growing of perennial crops such as robusta coffee in Buikwe and tea at Kasaku. Sugarcane growing at Lugazi and Kakira is partly attributed to the existence of Mabira forest due rainfall formation hence intensive-banana coffee system.

Areas with grasslands are associated with moderate seasonal rainfall hence giving rise to the growing of annual crops and animal rearing in Soroti, Kumi, Lira, Apac and Pader. The poor vegetation in Kaabong and Abim of Karamoja region has favoured pastoral system.

**CAPITAL AND TECHNOLOGY:** Accessibility to capital resources is not uniformly distributed in that:

Areas accessible to adequate capital have advanced agrarian activities. They therefore practice plantation farming, ranching, scientific selection of seeds and breeds. For example plantation, farms such as sugarcane estates at Lugazi, Kakira and Sangobay, Tea estates at Lugala and Kasaku in Buikwe give rise to intensive-banana-coffee system.

The inadequate capital explains why there is general backwardness of agricultural sector where many people still use rudimentary methods of farming such as the use of traditional tools such as hand hoes, pangas, slashers, poor seeds. The rearing of poor local breeds by the Karamojongs in Kaabong and Moroto and by the Bahima in Kiruhura and Mbarara has resulted into pastoral system.

Inadequate capital in most of the rural areas has resulted into cultivation on small plots and use of unskilled manual labour. Farming is limited due to the production of food crops on a household basis and few crops for sale. There is also subsistence animal rearing involving the use of local breeds, natural pastures in Kaabong, Kiruhura and Nakasongola.

Capital inputs such as tractors, harvesters, farm structures are very essential in promoting agricultural production. These are normally seen on plantation farms such as Kakira sugarcane plantation, Kibimba rice scheme in the intensive banana-coffee system

**TRADITIONS AND CULTURE:** The diversity of Uganda's agricultural practices reflects culture or ethnic diversity as seen below:

Some cultures support the practice of a given farming system, for example, the Karamojongs in Kaabong, Abim, Kotido and Moroto and the Bahima in Mbarara and Kiruhura believe in cattle rearing hence the pastoral system.

Different tribes have different staple food and this encourages the growing of particular crops like the Baganda believe in Matooke as their food crop hence bananas are widely grown. The Itesots in areas of Ngoro, Serere and Kumi are attached to millet while the Basoga grow sweet potatoes.

**INFRASTRUCTURE DEVELOPMENT /TRANSPORT:** This is not uniformly distributed in the country. Areas accessible to improved infrastructure in form of roads have advanced agriculture. Transport routes facilitate the development of commercial farming because of the ease of marketing of agricultural products as witnessed in Kampala, Mbarara, Mbale and Kabale. This explains why there are plantation farms such as Kasaku tea estate, Lugazi and Kakira sugarcane plantations in Jinja and Buikwe.

However, remote areas such as Nebbi, Bundibugyo, Kapchorwa, Kween, Napak and Abim with insufficient transport networks are still lagging behind in terms of easy transportation of crops like wheat and sorghum.

The feeder roads are almost impassable during rainy season in some parts of Kabale, Kisoro, Rukungiri, hence limiting the transportation and marketing of agricultural products such as coffee and Irish potatoes.

**MARKET:** The initial cash crop growing in central Uganda was partly favoured by: Accessibility to foreign markets via Lake Victoria and the East African railway. The growth of cash crops in Northern Uganda was mainly as a result of the extension of the Packwach railway line which connected northern Uganda areas like Gulu and Lira to the market in the South and abroad. There is a recent development of markets based on the promotion of non-traditional cash crops like Simsim, Varnilla, beans, maize and rice. This has resulted into commercialization of these crops. The distance from markets influences the various agrarian systems. For example, floriculture at Nsimbe estates, Kajansi and Entebbe all target urban centres like Entebbe and Kampala.

**LABOUR:** High quality labour in the agricultural industry is limited in Uganda.

Inadequate research accounts for the dominance of subsistence type of agriculture. It is mainly in the south and central Uganda that have access to such skilled manpower where there is advanced agriculture. Some parts have a surplus while others have difficulties in getting skilled manpower. Subsistence farming

tends to be intensive and mainly based on unskilled and semi skilled family labour as proved by the montane system in Kabale and Kisoro.

Traditional livestock in the pastoral farming system is based on family labour in Abim, Kaabong and Kotido. Skilled, semi-skilled and unskilled labour from long distances is employed on large plantations in form of researchers and mechanics and casual labourers at Kakira sugarcane plantation in Jinja.

**LAND TENURE SYSTEM:** Land ownership systems greatly affect agrarian systems differently as seen below:

In some parts of the south and central Uganda, land is privately owned by way of mailo land as seen in Wakiso, Mpigi and Kayunga. The people turn out to be squatters on the land which prevents the development of modern farming as land doesnot belong to them. It has resulted into land fragmentation due to dense population leading to the dominance of small scale peasant agriculture. This is common in Mukono and Wakiso. The kind of ownership limits mechanization-capital mobilization, infrastructural development and planning for maximum farm benefit. In pastoral communities like Kaabong, Nakasongola, Kiruhura and Abim, land is communally owned thereby bringing about overstocking leading to over grazing. Communal ownership allows free movement from one place to another with adverse effects like easy spread of livestock and human diseases.

**GOVERNMENT POLICY:** Deliberate government policy has direct influene on agriculture as seen below.

It has directed the crops to be grown in which area, for example, the colonial government determined where cotton was to be grown like soroti and Kumi in the Teso region, Lira and Gulu in the Northern system and Kamuli and Kaliro in Banana-millet-cotton system as well as coffee in areas such as Mukono, Mityana and Jinja in the intensive-banana-coffee system

There has been a deliberate government policy of diversification of agriculture which has led to commercialization of crops which were originally for subsistence, through the introduction of non traditional cash crops like vanilla and rice other than relaying on the traditional cash crops such as coffee, cotton and tobacco in the areas of Mukono, Mpigi and Masaka.

Of recent, the government has absolutely liberated the buying and exportation of produce and this tends to encourage agricultural modernization.

Rehabilitation of a number of research institutes such as Kawanda, Namulonge, Serere or Karengyere. This has resulted into planting of improved seeds by farmers. Therefore, a positive government policy determines the distribution of agricultural activities and level of agricultural development.

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### **SELF EVALUATION EXERCISE 12:1**

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1. To what extent has climate influenced agrarian systems in Uganda?
2. To what extent are agricultural systems in Uganda related to environmental factors?
3. Examine the influence of climate on agricultural practices in Uganda.
4. To what extend have soil types influenced agrarian systems in Uganda?
5. (a) Identify the relief regions of Uganda.  
(b) To what extent are agricultural practices in Uganda influenced by relief?
6. To what extent has rainfall reliability influenced the farming systems in Uganda?
7. To what extent have rainfall totals influenced the development of various farming systems in Uganda?

## **MEASURES BEING TAKEN TO IMPROVE THE FARMING SYSTEMS**

There is construction and rehabilitation of feeder roads to facilitate marketing of cattle and goats in areas like Kaabong and Kiruhura in the pastoral system, like coffee and tea in areas like Kayunga, Masaka, Mbarara, Bushenyi and Mayuge in the intensive banana-coffee lake shore system.

Increased research by NARO, NAADS and research stations that leads to the development of improved crop varieties for maize, cotton and beans in areas like Lira and Apac in annual cropping and Northern system.

There is provision of extension services through NAADs and Plan for modernization of agriculture leading to improved varieties of cotton, maize and cassava as well as breeds of cattle and goats in areas like Kumi, Soroti and Serere in the Teso system.

There provision of capital to farmers through micro finance institutions like FINCA and Pride.as well as formation of SACCOs leading to rearing of improved breeds of cattle in areas such as Kisoro, Rubanda, Kabale and Rukiga in the montane system.

Improving security through the use of UPDF to restore peace in annual cropping and Northern system in areas like Gulu, Lira, Kitgum, etc leading to continuous cattle rearing and crop production especially millet and sun flower.

There is mechanization of agriculture like ox-ploughing in areas of Soroti, Serere and Ngora in the Teso region, use of tractors in Kakira and SCOUT Sugar cane plantations in the intensive banana-coffee lakeshore system.

There is diversification of crops vanilla growing, upland rice project, fish farming and clonal coffee in Mukono, Wakiso, Wakiso, etc in the Intensive Banana-Coffee Lakeshore system.

Diversification of animals leading to rearing of a variety of livestock like cattle, goats and sheep as seen in areas like Kotido and Moroto in the pastoral system.

Introduction of better animal breeds like exotic cattle.This is seen in areas like Mbale, Kabale and Rukiga in the montane system.

Market research has been carried out so as to widen the market of agricultural products such as coffee, tea, maize and beans in areas such as Wakiso, Mukono, Mbale and Jinja in the intensive banana-coffee lakeshore system.

There is making of hay and silage during the dry season as seen in areas like Nakasongola, Buliisa and Kiruhura as seen in the Pastoral system.

There is intergration of animals like cattle and goats with crops such as sun flower, cotton and millet for instance Oyam, Dokolo and Otuke in the annual cropping and Northern system.

There is introduction of improved storage facilities such as silos for maize in Jinja at Agro-Ways limited in intensive banana-coffee system and milk cooling plants for preservation of milk for cattle in areas like Sheema, Ibanda and Bushenyi in the Western banana-cattle system.

Application of fertilizers and manures leading to increased agricultural production in form of vanilla, oil palm and sugarcanes in areas such as Kakira, Bugala, Kinyara and Lugazi in the intensive banana-coffee system.

There is spraying by use of pesticides/herbicides and chemicals such as acaricides as well as vaccination in areas like Beatrice dairy farm in montane system and Isingiro and Kiruhura in the pastoral system.

Establishment of processing industries which add value to products such as tea, coffee, cotton and cattle rearing in areas like Kamuli, Kayunga and Masaka in the intensive banana-coffee lakeshore system.

There is improvement in land tenure system through land consolidation in Kabale and Kisoro in the montane system leading to increased production of crops like Irish potatoes, tomatoes and bananas as well as extensive cattle and goat rearing.

There is introduction of irrigation farming like Mobuku irrigation scheme leading to increased production of onions and cotton.

Quarantine has been put in place in case of disease outbreak for cattle in areas like Buyende, Kayunga and Jinja in the intensive banana-coffee lakeshore system and Nakasongola and Kiruhura in the montane system.

There is construction of valley dams to provide surface water in the pastoral areas like Kaabong, Moroto, Kotido and Nakasongola to ensure constant supply of drinking water for cattle and goats.

Introduction of new varieties of fodder crops to supplement the natural pastures in areas like Kabale and Kisoro in the montane system.

There is increased education and sensitisation of the masses leading to better and modern methods of cattle rearing and growing of improved crop varieties of beans, maize and coffee in areas like Mukono and Wakiso in the intensive banana-coffee lakeshore system.

Introduction of new better quality and high yielding crop varieties like clonal coffee in areas like Masaka and Kayunga, and drought resistant maize, cassava and ground nuts in the annual cropping and Northern system in areas like Lira, Kitgum, Oyam and Apac.

## **STEPS TAKEN TO MODERNISE THE FARMING SYSTEMS IN UGANDA**

There is provision of inputs to farmers in form of equipment and quality seeds which have helped them grow on large scale for example seeds, hoes, pangas and seedlings in form of beans, maize and coffee in areas such as Masindi, Masaka and Luwero.

Encouraging market gardening in urban centres which require small pieces of land using scientific methods. This can be evidenced in areas such as Kabale, Arua, Soroti, Wakiso, Masaka and Kisoro.

Encouraging road construction to open up remote areas for easy transportation of agricultural products to market centres. This has been done in areas like Kayunga, Masaka, Mbarara, Bushenyi and Mayuge.

Increased research by NARO, NAADS and research stations as it is evident at Kawanda, Serere and Namulonge. This has led to development of fast and high crop varieties such as maize, cassava and cotton.

There is training of skilled labour force such as agricultural officers in places like Wakiso, Kiboga, Kabale, Wakiso, etc.

There is extension of credit facilities to farmers in form of loans so as to modernize the growing of crops such as bananas, coffee, rice and wheat as well as breeds of cattle in areas such as Mbale, Bushenyi, Kabale and Butaleja.

There is fighting of corruption through introduction of IGG and PAC leading to a reduction in the misappropriation of funds meant to modernize cattle rearing in areas such as Abim, Kotido, Nakasongola and Kiruhura.

Improving security through deployment of security personnels leading to restoration of peace in war torn areas such as Gulu, Lira, Kitgum, etc through peace talks and use of UPDF to wipe out the LRA rebels. This has ensured continuous cattle rearing and crop production especially millet and sun flower.

There is increased mechanization of agricultural sector through provision of walking tractors and ox-ploughs in Soroti, Kapchorwa, Serere and Ngora.

There is diversification of crops and animals for instance introduction of vanilla growing and upland rice project in Mukono, Bundibugyo and Wakiso, wheat and barley production in Kapchorwa and Kween.

Encouraging population control measures like use of family planning methods in densely populated areas like Kabale, Mukono, Kisoro, Mbale, Sironko and Rubanda. This is aimed at promoting largescale commercial agriculture.

There is Liberalisation and privatization of the economy that has encouraged commercial farming by private investors like Kakira sugar cane plantation and Kasaku tea estate.

Widening of Market through advertisement, regional intergration and market research so as to widen the market of agricultural products in areas like Wakiso, Mukono, Mbale and Jinja.

There is introduction of better storage facilities such as silos for maize in Jinja at Agro ways ltd, milk cooling plants for preservation of milk for cattle in areas like Mbarara and Kabale and cotton stores in Lira, Kaliro and Kasese.

Provision of free farm inputs in form of hoes, seedlings and insecticides in places like Soroti, Masaka, Wakiso and Mbarara. This has promoted largescale agricultural production.

Use of fertilizers and manures to improve soil fertility. This has led to increased agricultural production such as vanilla in Mukono and sugarcanes in areas such as Kakira, Kinyara and Lugazi.

There is disease control on the farms through spraying using pesticides and chemicals in areas like Kakira sugarcane plantation, Kalangala oil palm plantation and Beatrice dairy farm in Kabale.

Encouraging group farming and establishment of cooperative societies for example 'Send a cow' in areas such as Mubende, African 2000 network in Kisoro, Mubende and Iganga leading to increased production of cattle, goats, maize, sugar canes and vegetables.

There is establishment of agro-processing industries to enhance processing of agricultural products in areas like Mbarara, Mukono, Soroti, Mbale, Gulu and Bushenyi.

Land reform programmes have been undertaken like land consolidation in Kabale and Kisoro to facilitate commercial economy in line with increased production of irish potatoes, tomatoes, bananas and extensive cattle and goat rearing.

Importation of improved seed varieties and animal breeds like goats from South Africa to Kabale, Njeru, Kamuli and Kiruhura. This has led to high quality products.

Irrigation farming has been carried out in dry areas for example Mubuku irrigation scheme and Muhokya mini irrigation scheme in Kasese leading to increased production of onions and cotton.

There is construction of valley dams in areas like Kaabong, Moroto, Kotido and Nakasongola to ensure constant supply of drinking water for cattle and goats.

Crop rotation is being carried out to control soil exhaustion in areas like Lira, Nebbi, Wakiso, Mubende and Luwero.

There is increased agricultural education and sensitisation of the masses through mass media such as new vision and NTV, seminars and demonstration farms. The farmers are educated on better and modern methods of cattle rearing and growing of improved crop varieties of beans, maize and coffee in areas like Masaka and Lira.

There is terracing and contour ploughing so as to reduce soil erosion in highland areas such as Rubanda, Kabale and Kisoro.

There is government policy of resettling people from densely populated areas to sparsely populated areas to create land for farming for instance from Kabale to Kibale and from Bududa to Kiryandongo. The government has also encouraged voluntary migration from densely populated areas to sparsely populated areas to increase land for farming like from Kabale to kiboga and Kibale.

There is introduction of agro-forestry to control soil exhaustion for instance cocoa production in Bundibugyo and sugarcane production in Kakira and Lugazi along side tree planting.

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### **SELF EVALUATION EXERCISE 12:2**

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1. Draw a sketch map of Uganda and on it mark and name the following farming systems:
    - (i) Intensive –banana-coffee lake shore system
    - (ii) Pastoral and annual crop system
    - (iii) Annual cropping and cattle Northern system
  - (b) Describe the characteristics of any **one** farming system shown on the map.
  - (c) Outline measures being taken to improve the farming system chosen in (b) above.
2. (a) Distinguish between Annual cropping and west Nile farming and Montane farming system.
  - (b) Describe the measures being taken to modernise the farming systems named in(a) above.