

Assessment of Cultural Conditions for Banana and Plantains in the Territories of Maniema, D.R.C.

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ABSTRACT

The aim of this study was to assess the growing conditions (source of planting materials, age of the banana plantations and the cropping system) of banana and plantain trees in the seven territories of the Province of Maniema in the DRC. We started from a sample of 63 farmers practicing banana cultivation in the study area. A total of 7 territories for the entire Province with 3 villages per territory, 3 fields per village, were involved. The results obtained showed that: the growing conditions vary relatively depending on the territories of this Province where 100% of banana trees are grown in association with rice, cassava, corn or other crops; 95.24% of farmers use shoots from neighboring fields; 90.48% use suckers from plantations located far from their areas and 52.38% of farmers use suckers from the same plantation. On average 42.86% of banana plantations are over 10 years old; 38.10% of banana plantations are 5-7 years old and 14.29% banana plantations are 3-5 years old. We recommend that farmers use suckers from their own fields to avoid disease infections, take good care of the crop for good production, and, the political authorities and their partners in this matter come to the rescue of this culture.

Keywords: assessment, growing conditions, bananas, plantains

INTRODUCTION

World banana production amounts to 74 million tons per year. About 25 million tons, mainly plantains are produced in Africa (Swennen & Vuylsteke, 2001). In 2010, Africa produced 10 311 554.00 tons of bananas against 26,900,250.00 tons of plantains in the same year; in the Democratic Republic of Congo, 316,472.00 tons of bananas were produced, compared to 1,250,000.00 tons of plantains (FAOSTAT, 2012). Bananas and plantains are among the staples of the diet of populations in Central Africa with 35% calorie intake. Banana cultivation in Central Africa employs more than 50% of the active rural population and contributes significantly to the agricultural gross domestic product of the countries of this sub-region. It therefore plays an important role in the food security of populations, in nutrition and also provides part of the income for small producers (FAO, 2010). Its importance is all the more marked in the Congo Basin where there is a great diversity of cultivars. All types of plantains are observed there: French-horns, False-horns and True-horns (Ganry et al., 2012).

This crop, most often carried out in family farming, often has fairly low yields in relation to land and labor. This family food production is indeed poorly technically supervised and benefits from few scientific and technical innovations (Moïse & Ludovic, 2019). However, the production systems of tropical Africa are heterogeneous in terms of ecology, densities, plant and animal species, agricultural tools, farming techniques, combinations or dissociations of productions (De Lapeyre, 2015). The behaviors of the farmers are of an extreme richness, variable from one region to another, from one village to another, from one dwelling to another and of an intense flexibility adaptable to all the modifications of the physical and human environment (FAOSTAT, 2009). In the Democratic

Republic of Congo, bananas and plantains constitute a staple food for the population of the North-East and the Center of the Country. After the harvest, nearly 70% of banana production is consumed there directly by local producers (rural and urban-rural), 30% for marketing (Bakelena et al., 1996). In banana production areas, the farmers' economy is dependent on it. For areas with low production, household incomes are low, while in regions where production is high, incomes are higher. The general objective of this study was to assess the growing conditions for the cultivation of banana trees and plantain trees in the seven territories of the Province of Maniema in the D.R. Congo. And specifically: Identify the different banana cropping systems practiced in each territory; Appreciate the different systems in relation to the production of bananas and plantains; Evaluate the banana and plantain cultivars used by farmers according to their importance. In carrying out this investigation, we generally assumed that the growing conditions of banana and plantain trees are variable in the study area depending on the customs and socio-food importance granted by the farmers. Specifically, we have estimated that there will be several banana farming systems; some systems favor production and others do not; there are several cultivars of bananas and plantains with variable importance depending of customs.

MATERIALS AND METHODS

This study covered the 7 territories of the province of Maniema which are: Kailo, Pangi, Kibombo, Punia, Lubutu, Kasongo, and Kabambare. The various territories and villages of the Province of Maniema surveyed are represented by Figure 1.

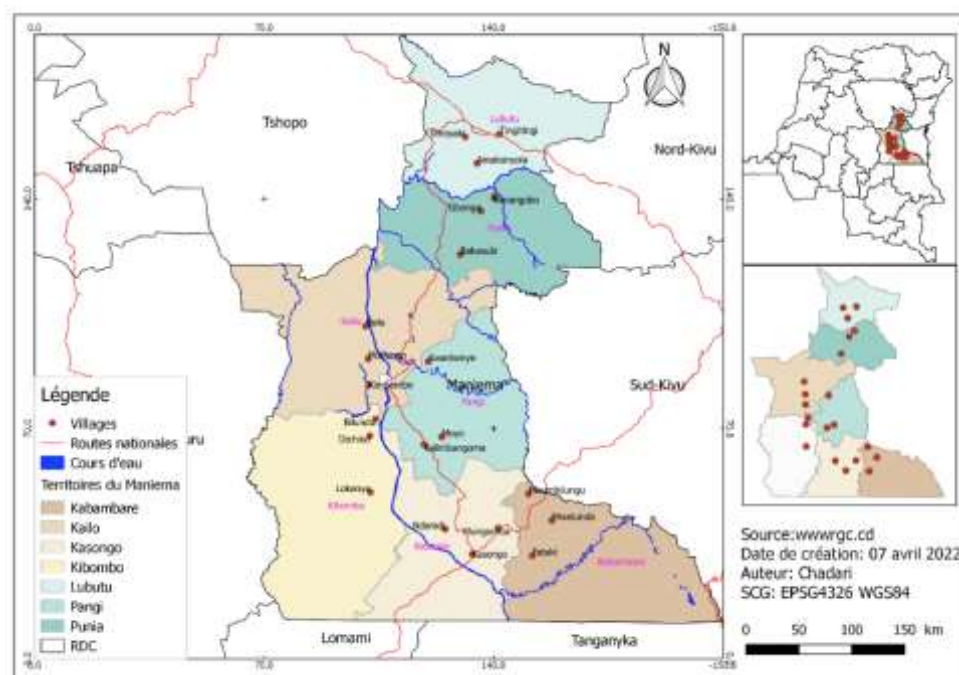


Figure 1: Administrative map of the study area (Province of Maniema)

The investigations were carried out in 3 villages per territory, i.e. 21 villages for the whole of the Province of Maniema, located in the south-eastern region of the basin Central Congo, during the period from April 2021 to February 25, 2022.

Location of the Study Area

The study was conducted in the Province of Maniema, located in the Center-East of the country (R.D. Congo) and extends between 0° and 5° South latitude and 24° 55' and 28° 8'

East longitude at an altitude of 497m. This Province is bordered to the East by the provinces of North and South Kivu, to the North by the Province of Tshopo, to the West by the Province of Sankuru and to the South by the Provinces of Lomami and Tanganyika. Its total area is 132,520 km² or 5.6% of the total area of the country (Makondambuta, 1997).

Administrative Subdivision

The Province of Maniema was created by Ordinance Law No. 88-031 of July 20, 1988. It is the largest province resulting from the dismemberment of former Kivu, whose area covers four times that of North -Kivu and two and a half times that of South Kivu. This Kivu division would have served as an "experimental case" in the decentralization process initiated by President Mobutu in the 1980s. It is administratively subdivided into seven territories: Kailo, Kasongo, Kibombo, Kabambare, Pangi, Punia and Lubutu. The province comprises 19 sectors, 16 chiefdoms and 7 cities or rural communes (Makondambuta, 1997).

Climate

The province of Maniema enjoys a hot and humid tropical climate of the AW type according to the Koppen and Martonne classification. The latter evolves towards the equatorial type (AW1) in the North and towards the Sudanese type (AW4) in the South. In these two trends, the length of the dry season is 2-3 months and 3-4 months respectively. It includes two major seasons; the dry season and the rainy season. The average annual temperature is 27°C and the annual precipitation amounts to 1650mm of water (Makondambuta, 1997 Op.cit.).

Soil

Pedogenesis has generated climatic soils of three types in Maniema, namely: Arenoferralsol: this group of kaolisol extends from north to south along the Congo River. It occupies the east of Lubutu, the center of Kailo including Kindu, almost all of Kibombo and the south of Kasongo; Ferrisol: covers a good part of the province of Maniema, with the exception of the South of Kibombo and Kasongo, and the North of Lubutu, it is individualized to the South of Kabambare and yet the ferralsol of the Yangambi type is identified to the North of Lubutu (Ctcpm, 2002). The soil being an extremely complex building, it sometimes varies quite considerably in the same area, ranging from sandy in the territory of Kibombo to compact clay in the forest areas. These soils are partly present in the territories of Kasongo, Kailo, Pangi, and Kibombo (Makondambuta, 1997).

Vegetation and Hydrography

Forest

In the Province of Maniema, the equatorial forest describes an arc starting from Kindu passing through Shabunda and Walikale to join the equatorial forest in the south of Beni. Starting from the South of Maniema at the South Level of UVIRA to the limit with the Province of Tanganyika, there are mosaics of wooded savannahs and gallery forests reflecting the degradation of the forest by the action of man. The fauna is rich and varied. Two major plant formations cover Maniema: the dense humid forest and the savannah. The dense forest covers the territories of Lubutu, Punia, and Pangi and part of Kailo and Kibombo. This forest is rich in valuable forest species. The gallery forests cover the territories of Kasongo, Kibombo as well as part of the territory of Kabambare where the gallery forest is called Nywema, hence the origin of the name Maniema (Makondambuta, 1997).

Savanna

The south of Maniema is mainly occupied by shrubby savannah. Within it, some grassy savannahs are present in the South-West, while in the South-East, we find different types of vegetation: shrubby savannah, some small open forests, a small wooded savannah, some wooded savannahs and smaller agricultural areas. These two characteristic ecosystems of dense forest and savannah are relatively well delimited and are explained by the distinct climates experienced by the north and south of the province. Climatic conditions vary from north to south as one moves away from the equator (Makondambuta, 1997).

Hydrography

The Congo River crosses the province from South to North. It is navigable from Kindu to Ubundu (Tshopo Province). It is watered by several tributaries, the most important of which are: Lulindi, Musukuyi, Mulongoy, Ulindi, Kasuku, Kunda, Lufubu, Lowa, Lweki and Elila, etc. (Makondambuta, 1997 Op.cit.).

Economy

The economy of the province of Maniema is essentially based on agricultural production, which employs the majority of the population. It is largely subsistence agriculture characterized by a low degree of mechanization. Rice, peanuts, cassava, maize and bananas are produced there as the main food crops (Makondambuta, 1997 Op.cit.).



Figure 2 and 3: Cropping systems in the different study areas in the Province of Maniema (Photos: Salumu)

As for the industrial crops inherited from colonization and which mainly concerned cotton, coffee and palm oil, they have been at a standstill for several years. Only a few rice mills still remain, the husking of which is now carried out in an artisanal manner, due to the lack of processing factories that have been gradually abandoned by their owners. Traditional livestock farming is practiced there as everywhere, mainly focused on small livestock and poultry but which is barely enough to meet the needs of the population. Artisanal fishing takes place on the Lualaba River, its tributaries and on Lake Ndjale in the territory of Kibombo (Mrac, 2011).

Materials

The biological materials used in this study are the different banana and plantain cultivars (*Musa* spp.) inspected in the fields and in the gardens of the farmers' huts. And Figure 4 illustrates some banana and plantain cultivars inspected in the farmer's field in Kabambare territory.



Figure 4: Some banana and plantain cultivars inspected in Kailo territory (Photo: Shadari)

Methods

To collect information related to growing conditions and knowledge of BBTD, we surveyed 63 farmers practicing banana cultivation in the study area. A structured questionnaire was used to obtain information relating to the cultivation conditions of the banana fields (source of planting materials, age of the banana plantation and the cultivation system). A total of 7 territories for the entire Province studied were surveyed due to 3 villages per territory, 3 fields per village. Villages were selected based on the existence and abundance of banana plantations in the study area. Farmers were also in turn selected based on the size of their banana plantations. For the interview, the head of household alone or accompanied by members of his family answered the interview in relation to the growing conditions of his banana plantation.

RESULTS AND DISCUSSION

Cultivation Conditions

Banana cropping system in the study area

Figure 5 presents the values related to the banana cropping system in the study area.

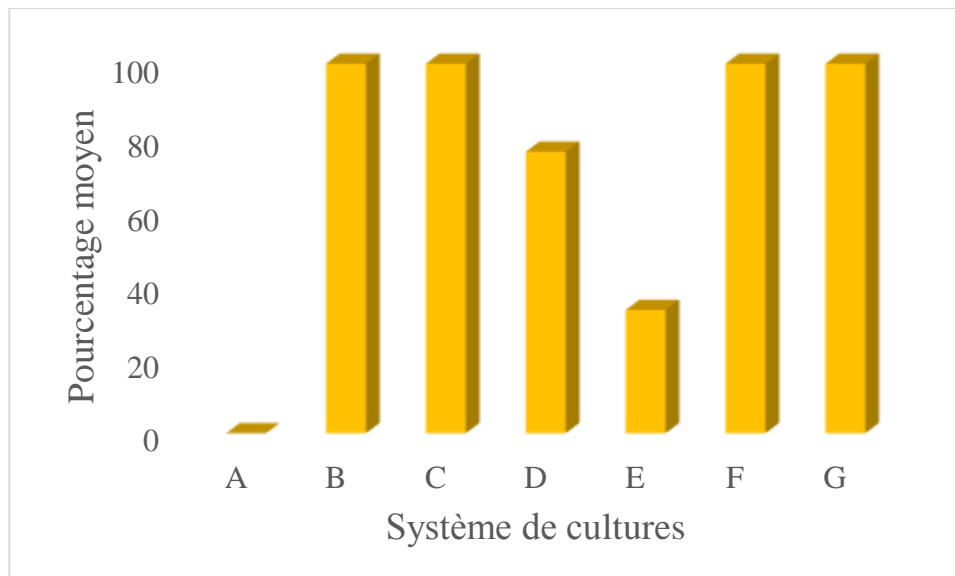


Figure 5: Cropping system in the zone of study

Legend: A: Banana tree in monoculture; B: Banana tree in association with rice; C: Banana tree in association with cassava; D: Banana tree in association with sweet potato; E: Banana tree in association with beans; F: Banana tree in association with maize; G: Other.

The analysis of the results listed in Figure 5 shows that, in the province of Maniema; 100% of banana trees are grown in polyculture, either in association with rice, cassava, maize or other crops, the banana-sweet potato association represents 76.19%, followed by the banana-bean association 33.33%. However, there are no monoculture banana plantations. In DR Congo, the banana tree is cultivated at different altitudes and its production is distributed throughout the country, on large and small farms. In the country and in the Province of Maniema in particular, cultivation is practiced in three systems: in the outskirts, banana trees are grown in peasant fields often in association with other crops (rice, cassava, etc.), in secondary forest old or fallow and in the city center, the banana tree is farmed. Bananas and plantains are produced in home gardens or intercropped with other food crops in shifting cultivation systems. They are planted on land with natural vegetation where the cover crop has been cut and/or burned. According to Ngama (2015), banana production is done under different cropping systems, namely box crops, field crops, association or monoculture. Mixed cultivation is practiced only on small holdings in old secondary forest which regenerates naturally or artificially from old native forest vegetation and which shows marked differences in the structure of the forest. He goes on to say that these associations are complex and depend on the diet and economic importance of each region. However, these fields do not constitute large plantations. However, mulching and the application of manure are not practiced. Diseases and pests are not as well controlled. Little care is given to the choice of land to install a banana crop. According to Dheda et al. (2011), most bananas are grown in the backyard or in home gardens with an area ranging from 0.5 to 4 ha where several crops are grown together for food self-sufficiency. Onautshu (2013) reports that these home gardens are exploitative systems permanent crop and livestock farms, stratified and very diverse,

located around the houses and where the emphasis is on domestic plant species with multiple uses, ligneous and herbaceous. These fields do not constitute large plantations of pure crops, well fertilized and protected against diseases and pests, underlines the same author. This system is practiced by the peasants using all that is like kitchen waste, harvest waste, faecal matter and others in the form of organic matter used for plant nutrition.

Sources of planting material

The values relating to the source of planting materials in the study area are presented by the graph in Figure 6.

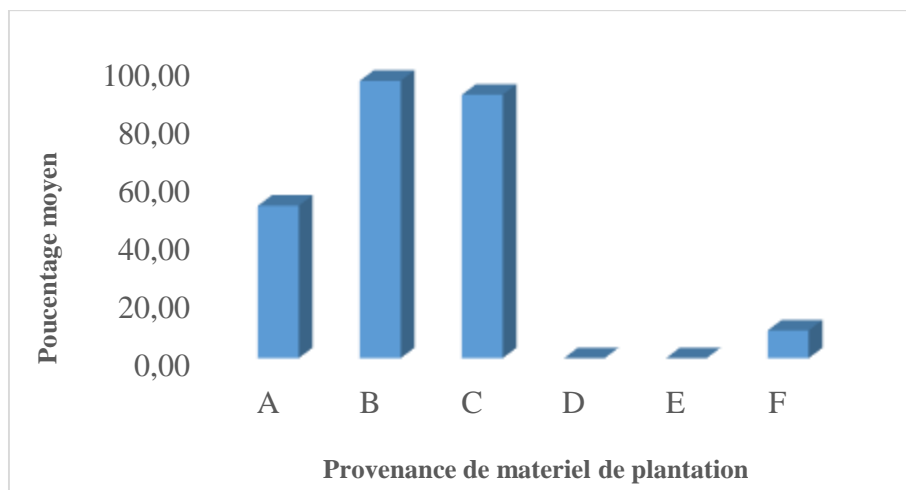


Figure 6: Source of planting materials

Legend: A: Offshoots from the same plantation; B: Discharges from neighboring fields; C: Discharges from plantations located far from the area; D: Vitro-plants distributed by state services (IPAPPEL, Research, ONGD); E: Vitro-plants purchased from private individuals; F: Other to be specified.

The analysis of the results listed in Figure 6 shows that in the province of Maniema; 95.24% of farmers use shoots from neighboring fields; followed by 90.48% who use suckers from plantations located far from their areas; 52.38% of farmers using suckers from the same plantation. However, 9.52% of farmers mention several other reasons. And yet, the vitro-plants are not distributed by the state services (IPAPPEL, Research, ONGD) throughout the Province and even less the vitro-plants purchased from the private sector. The analysis of all of these results reveals that the farmers of the Province of Maniema use our controlled and non-sanitized planting materials from neighboring fields or their own fields and no sources of supply of rejects or vitro - healthy seedlings do not exist in this study area. According to Dheda et al. (2011), the planting material used by farmers consists mainly of shoots from old fields or neighboring fields that have not undergone any treatment. In practice, the best planting material is made up of 3 main sources (bayonet shoots, vitro plants and shoots from macro propagation) recalls the same author. The shoot is chosen from a healthy plant in a disease-free banana field, he points out. Banana plantations are established by planting weanling suckers and bayonet suckers, the corn uses of which are peeled off and the pseudostem cut a few centimeters above the corms. This practice contributes to phytosanitary control, report Swennen and Vuylsteke (2001). While Rennes (2006) reports that the plant material used for the establishment of a banana plantation, whether in conventional cultivation or in association with other productions, must be of the best quality. Most often, the plants or tufts intended to provide the planting materials are chosen on the basis of the plant that carries them (vigor, productivity, absence of disease symptoms) reports Ngama

(2015). Similarly, Lassoudière (2007) recommends using only healthy and homogeneous material.

Age of banana plantation in the study area

Figure 7 presents the values relating to the age of banana plantations of farmers in the study area.

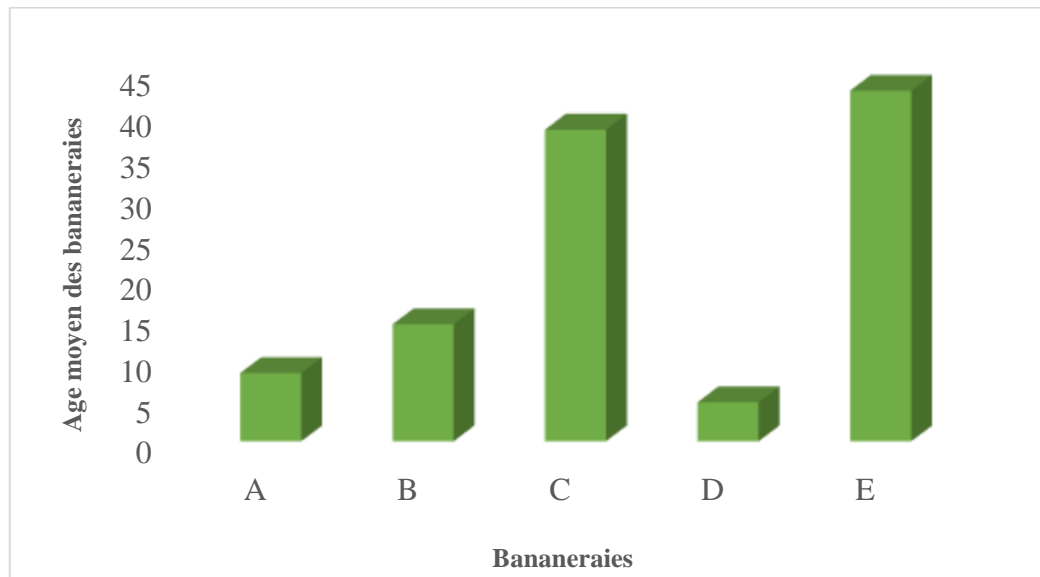


Figure 7: Age of the banana plantation in the study area

Legend: A: Plantation less than 3 years old; B: Plantation 3-5 years old; C: Plantation 5-7 years old; D: Plantation 7-9 years old; E: Plantation over 10 years old.

The analysis of the results recorded in Figure 7 generally shows that the age of the banana plantations varies from 3 to 10 years in the banana production areas of Maniema where 42.86% of the surveyed banana plantations are over 10 years old, followed by 5-7 year old banana plantations (38.10%), 3-5 year old banana plantations (14.29%), banana plantations less than 3 years old (8.33%) and 7-9 year old banana plantations (4.76%). These results, moreover, are contradictory to those of Ngama et al. (2014) in similar peasant conditions where more than 55% of the banana plantations were 3 to 7 years old. According to Dhed'a (2011), the age of farmers' banana plantations is about 3 years followed by their abandonment to allow the forest to recover and thus promote soil fertilization. In principle, the strains of banana trees produce for 5 years, beyond which it is necessary to replant from a side shoot taken from a healthy plant. According to the same author cited above, it is rare to find banana plantations in rural areas with a few hectares outside the villages with a view to obtaining high yields for more than 7 years of cultivation. This is also demonstrated by the same author, for whom banana trees are perennial monocotyledonous plants which follow one another. From its underground stem (also called bulb, stump or rhizome) will grow shoots (or offshoots) which will ensure, by vegetative way, the sustainability of the banana tree. Each shoot can give rise to a banana plant that can succeed the mother plant on the same stump or be detached to be planted and cultivated elsewhere, suggests Dhed'a (2011 Op.cit.).

Table 1: Different banana and plantain cultivars used by farmers according to their importance in the territory of Kasongo

Cultivars	Genotypes	Absolute frequencies	Relative frequencies
Atili	ABB	1	3,57
Bambote	AAA	1	3,57
Kakumbi	ABB	1	3,57
Kamera	AAA	4	14,29
Kangindi	ABB	1	3,57
Kavava	ABB	3	10,71
Kibubu	ABB	1	3,57
Lwizi	ABB	3	10,71
Mbole	ABB	2	7,14
Mbudi	ABB	7	25,00
Merenge	AAA	1	3,57
Muke muyaudi	AAA	1	3,57
Kangindi	ABB	1	3,57
Sola	AAA	1	3,57
Total		28	100

CONCLUSION AND RECOMMENDATIONS

This study aimed to assess the growing conditions (source of planting materials, age of the banana plantations and the cropping system) of bananas and plantains in the seven territories of the Province of Maniema in the R D. Congo. A sample of 63 farmers practicing banana cultivation in the study area was used. A total of 7 territories for the entire Province were surveyed due to 3 villages per territory, 3 fields per village. The results obtained indicated that: the cultivation conditions vary relatively according to the territories of Maniema. 100% of banana trees are grown in association with rice, cassava, corn or other crops; 95.24% of farmers use shoots from neighboring fields; 90.48% use suckers from plantations located far from their areas and 52.38% of farmers use suckers from the same plantation. On average 42.86% of banana plantations are over 10 years old; 38.10% of banana plantations are 5-7 years old and 14.29% banana plantations are 3-5 years old. We recommend that farmers use suckers from their own fields to avoid disease infections, take good care of the crop for good production. And, the political authorities and their partners in this matter come to the rescue of this culture, which the banana tree and farmers in suffering.

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