



E-ISSN: 2320-7078

P-ISSN: 2349-6800

[www.entomoljournal.com](http://www.entomoljournal.com)

JEZS 2022; 10(5): 311-320

© 2022 JEZS

Received: 27-07-2022

Accepted: 30-08-2022

**Alpha Cisse**

a) Alioune Diop Bambey University, Higher Institute of Agricultural and Rural Training (ISFAR), Plant Productions Department, BP 54 Bambey, Senegal

b) Cheikh Anta DIOP University, Sciences and Technologies Faculty, Departments of Animal Biology, Laboratory Genetics, Entomology and Population Management Team, BP 5005 Dakar, Senegal

**Souleymane Dia**

National Agency for Agricultural Insertion and Development, Tamba Department

**Michel Bernard Diatta**

Alioune Diop Bambey University, Higher Institute of Agricultural and Rural Training (ISFAR), Plant Productions Department, BP 54 Bambey, Senegal

**Mouhamed Seck**

Alioune Diop Bambey University, Higher Institute of Agricultural and Rural Training (ISFAR), Plant Productions Department, BP 54 Bambey, Senegal

**Mbacke Sembene**

Cheikh Anta DIOP University, Sciences and Technologies Faculty, Departments of Animal Biology, Laboratory Genetics, Entomology and Population Management Team, BP 5005 Dakar, Senegal

**Corresponding Author:****Alpha Cisse**

a) Alioune Diop Bambey University, Higher Institute of Agricultural and Rural Training (ISFAR), Plant Productions Department, BP 54 Bambey, Senegal

b) Cheikh Anta DIOP University, Sciences and Technologies Faculty, Departments of Animal Biology, Laboratory Genetics, Entomology and Population Management Team, BP 5005 Dakar, Senegal

## Cultivation practices and phytosanitary problem of cassava in the department of tivaouane, senegal

**Alpha Cisse, Souleymane Dia, Michel Bernard Diatta, Mouhamed Seck and Mbacke Sembene**

DOI: <https://doi.org/10.22271/j.ento.2022.v10.i5d.9074>

**Abstract**

Cassava plays an important role as a subsistence and cash crop in rural areas. Despite its importance, its production in Senegal remains low compared to other African countries. Nowadays, it is confronted with numerous constraints. It is in this context that a study was carried out on the cassava production system in the Thiès "cassava granary" region, with the objective of identifying, through cultivation practices, the phytosanitary problems encountered by farmers. It was conducted in eight communes located in the department of Tivaouane, some of which are located in the Niayes agro-ecological zone and others in the central-northern groundnut basin. Surveys were conducted among the largest cassava producers in these communes. Our study indicates that the cultivation of cassava is conducted in the rainy season with the same practices over time. Of the five varieties listed by the President of the Interprofession Manioc du Sénégal, only four are grown in the areas surveyed. The Terrasse (43%) and Kombo (36%) varieties are grown more by our respondents in the Niayes area. Soya (75%) and Wallet "Parydiey" (20% of our sample) dominate in the central-northern groundnut basin. The study also revealed that cassava farmers face constraints related to crop diseases and pests, which consequently have a strong impact on their harvest and income.

**Keywords:** Cassava, food security, pest problems, varieties

**Introduction**

In 2018, nearly 280 million tons of cassava were produced worldwide on an approximate area of 24.6 million ha, making the plant, the 4th largest crop production after rice, wheat and maize. Africa accounts for 60% of this global total (FAOSTAT, 2019). Cassava production helps address the food insecurity prevailing in many Sahelian countries. In Senegal, for example, the government, by Ministerial Order No. 5737 MAEH of 09/07/2004, had set up a Special Program to Revive the Cassava Sector in Senegal (PSRFMS). Indeed, the objective of this program was to contribute to stimulating the economy but also to increasing the income of the actors. Cassava is not one of the main crops, but it plays a relatively important role in agricultural activities since it accounts for 25% of total vegetable production<sup>[1]</sup>. It has been cultivated long before independence and is becoming more and more widespread in the agro-ecological zones. In 2008 (the record year for national production), statistics from the Ministry of Agriculture revealed that cassava was grown throughout the country, mainly in the regions of Thiès, Kaolack, Kolda, Fatick, Louga, Diourbel, and Saint Louis. Thiès, a region with high potential for cassava production, produces more than 90% of the national cassava production<sup>[3]</sup>. It is one of the regions where agriculture plays an important role in socio-economic activity. However, despite its importance and the efforts made by the State, cassava has not yet been a real development in the basic diet of the population. Today, one of the main constraints in the areas of the country where this crop is grown is the more or less considerable decline in production. Except for 2008, Senegal has not yet managed to reach the one million ton mark compared to other countries. Indeed, it has fallen from seventh (2012) to ninth (2017) position among cassava producing countries in West Africa (FAOSTAT, 2019). Thus, a study entitled "Study of the cassava production system in the department of Tivaouane" was conducted in eight (08) communes of Tivaouane distributed in the agro-ecological zones of the Niayes and the center-north groundnut basin, the general objective was to study the cassava production system in these eight (08) communes with the phytosanitary problems that cassava farmers

encounter, constraints related to diseases and pests of the crop that strongly influence their harvest.

## 2. Materials and Methods

### 2.1 Study area

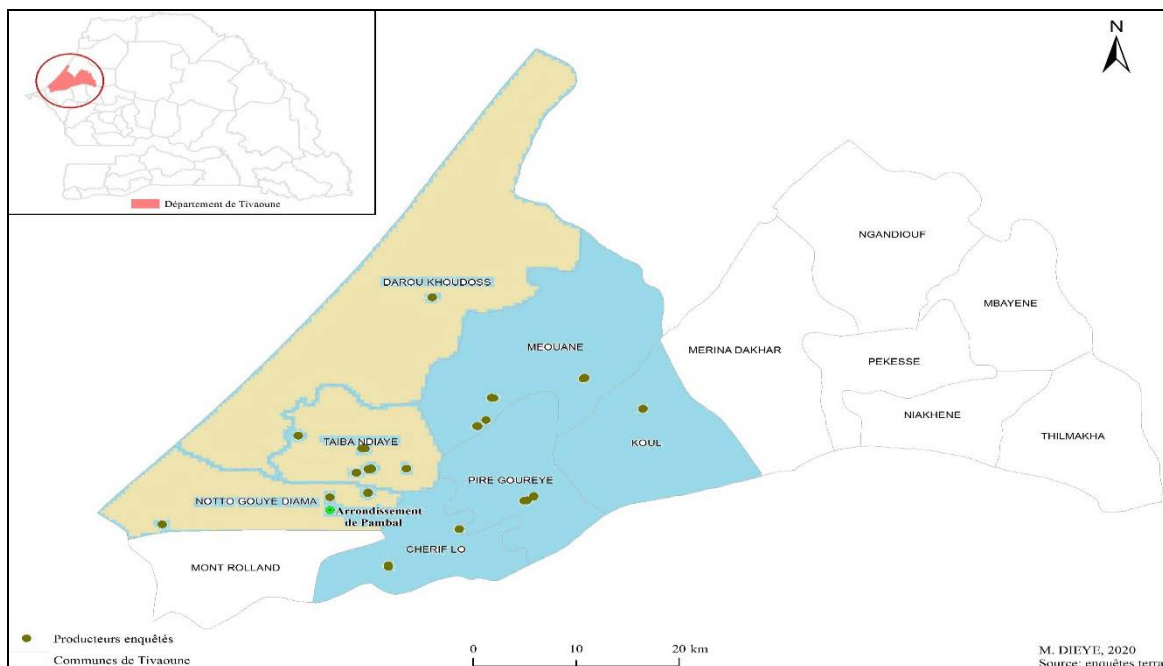
#### 2.1.1 Geographic and administrative location

The study took place in Tivaouane, one of the departments of the Thiès region, located as the crow flies 22 km northeast of the city and about 62 km from Mbour (another departmental capital). Bordered to the west by the Atlantic Ocean, to the north and east by the department of Kébémér (Louga region), to the southwest by the department of Thiès (Thiès region) and to the southeast by the department of Bambey (Diourbel

region), the department of Tivaouane, covers 3,217 km<sup>2</sup> of the national territory and includes four (04) districts: Méouane 1,058 km<sup>2</sup>, Niakhène 867 km<sup>2</sup>, Pambal 670 km<sup>2</sup>, Mérina Dakhar 622 km<sup>2</sup>.

In total, seven (07) communes are concerned by our study; some are located in the Niayes agro-ecological zone and others in the central-northern groundnut basin (CNBA). They are respectively:

- Darou Khoudoss, Taïba Ndiaye, Notto Gouye Diama for the Niayes
- Chérif Lo, Koul, Méouane, Pambal and Pir for the CNBA.



**Fig 1:** Geographical location of the surveyed areas

### Biophysical framework

#### Soils

In the department of Tivaouane, the following soil types are distinguished

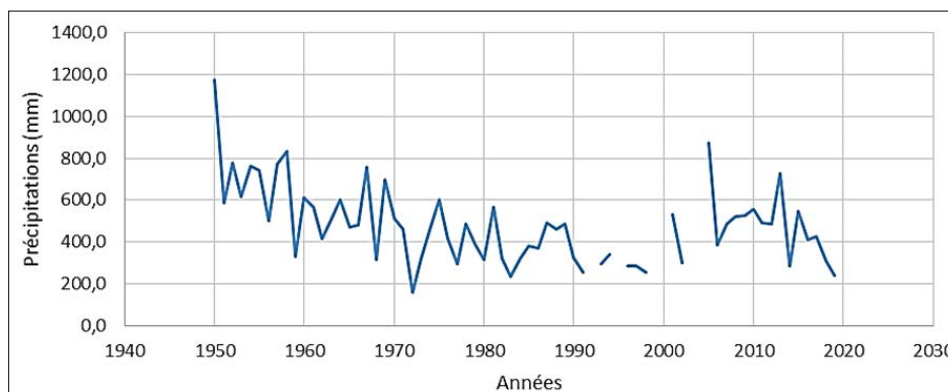
- Leached tropical ferruginous with sandy texture (95%), characterized by their low clay and organic matter content in the surface horizons and their high permeability [2];
- Tropical ferruginous with a sandy-clay texture (Deck-dior);

- Leached tropical ferruginous with a clay-humus texture (Decks) or hydro morphs with a humus texture in the lowlands, rich in calcium and clay.

#### Climatic data

The climate is Sudan-Sahel. The lowest and highest temperatures occur in December - February (16° C) and March - October (35° C) respectively.

Below is the rainfall (mm) for Tivaouane Department from 1950 to 2019 (ANACIM, 2019).



**Fig 2:** Cumulative rainfall of Tivaouane from 1950 to 2019

### Vegetation

The vegetation of the area is a shrubby savanna, dominated by

species such as *Acacia senegal*, *Andasonia digitata*, *Balanites aegyptiaca*, *Borassus aethiopicum*, *Guiera senegalensis*, *Zizyphus mauritiana* [4]. To these can be added *Anacardium occidentale*, *Guiera senegalensis*, *Casuarina equisetifolia*...

**Materials and Methods**

The study focuses on the cassava production system in the department of Tivaouane. It will therefore study through surveys: the cultivation practices of farmers in the area, the phytosanitary problems encountered in agricultural production.

**Survey tools**

A questionnaire was designed to collect information for this work. The questionnaire contains two modules. The questionnaire was implemented using the SurveyCTO software (enketo). The field surveys were carried out on tablets made available to us by BAME. Data processing and analysis were carried out in part on Excel software but also on STATA 15. A GPS and a camera were also used for mapping and photography respectively.

**Sampling**

The choice of 17 villages is not accidental. Indeed, information obtained from the president of the cassava interprofession during a survey mission in the study area (Tivaouane) allowed us to use purposive sampling (blind sampling), particularly the "snowball" sampling. During the survey, the latter gave us the flagship areas and/or localities where cassava production remains much more developed. For each village chosen, he put us in touch with an economic operator who put us in touch with four other large producers, generally the best known because of their reputation. Finally, five large producers were chosen per village.

**Field surveys**

A field mission was conducted in January 2020 to collect data. The collection of data was facilitated by individual interviews with producers. The surveys were conducted with the support of ISRA BAME and a geographer working in this structure. The questionnaire was completed following interviews with resource persons and the president of the Interprofession du Manioc du Sénégal (IMS). The surveys were sent to 85 producers in 17 villages in eight communes of

the department of Tivaouane.

**Result and Discussion**

**Results**

The data analyses were carried out taking into account the two agro-ecological zones: the Niayes and the central-northern groundnut basin. The survey revealed that the majority of producers are adults. Indeed, the majority of the respondents (65%) in the Niayes are between 15 and 64 years, and the remaining (35%) are older. In the surveyed area of the central-northern groundnut basin, 82.2% of the producers surveyed are between 15 and 64 years of age, while the remaining 17.8% are in the 65 and over age group (Table 1).

Note: Only the economic operators are members of the CODEPROMAT group in Tivaouane. Apart from the latter, none of the other respondents declared that they were members of a cassava association, group or federation.

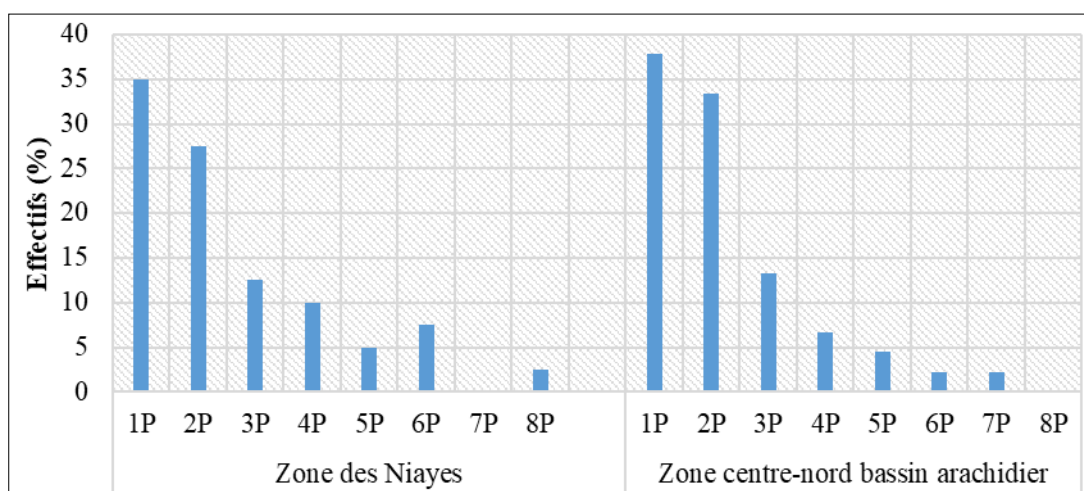
**Table 1:** Age des producteurs de manioc dans les Niayes et le centre-nord bassin arachidier

Agro ecological zones	Age group	0-14 years	15-64 years	65+ years
Niayes	Surveyed (%)	0	65	35
Centre-north groundnut basin	Surveyed (%)	0	82,2	17,8

**Cultivation practices**

**Number and average total area of cassava plots**

In the areas surveyed, the total number of cassava plots available to producers varies from one to eight. Analysis of the data reveals that the majority of producers have a number of plots equal to one and two. Indeed, the proportions are respectively 35 and 27.5% (Niayes surveyed area); 37.8 and 33.33% (center-north groundnut basin). As for the rest of the producers surveyed in the Niayes zone: 12.5%, 10%.5%, 7.5%, and 2.5% stated that they had a number of plots equal to three, four, five, six, and eight respectively. In the central-northern groundnut basin, 13.3% of producers surveyed had three plots, 6.7% had four, and less than 5% had five. This is followed by equal proportions of those with six and seven plots, or 2.2% each (Fig 3).



**Fig 3:** Total number of cassava plots (P) of producers in the area

The total area of the producer's cassava plots averages between 1.5 and 11 ha. Fig 4 shows the average total area of

cassava plots as a function of the number of plots in the Niayes zone and the central-northern groundnut basin. In fact, it shows that in the Niayes zone surveyed, cassava producers with one, two, three, four, five, six, and eight plots sow areas of 1.5 ha; 3.4 ha; 6 ha; 8.7 ha; 11 ha; 11 ha; and 8 ha,

respectively. At the CNBA, the areas sown by respondents with one, two, three, four, five, six, or seven cassava plots are 2.7 ha; 4.7 ha; 7.4 ha; 4.7 ha; 8 ha; 8 ha; and 6 ha respectively.

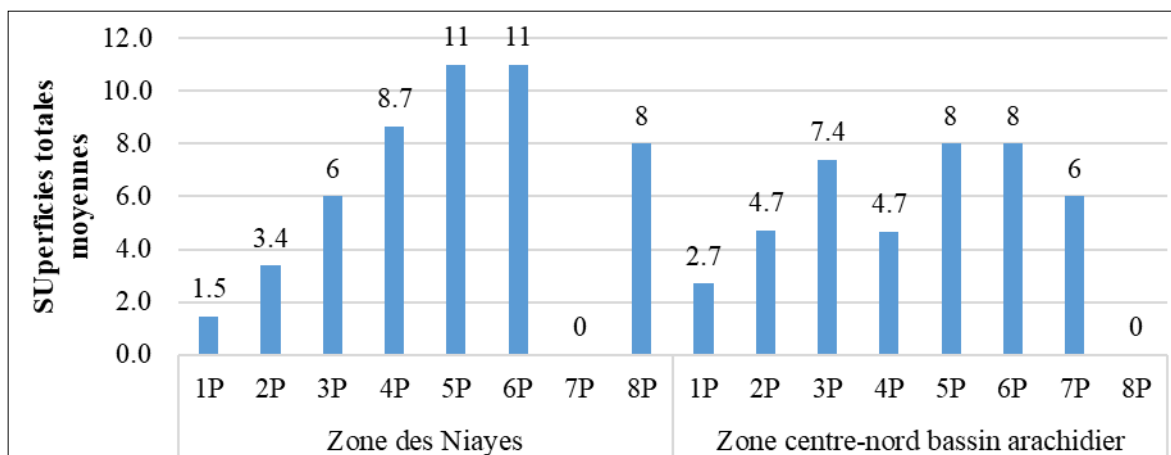


Fig 4: Average total area according to the number of cassava plots owned in the Niayes and the central-northern groundnut basin

**Period of plantation of the cuttings**

The surveys revealed that in the study areas in question, planting is done in the same way and during the same period. Indeed, cassava, like groundnuts, is planted at the first rains, just at the beginning of the rainy season.

**Provenance and selection of cuttings**

In the surveyed areas of Niayes and CNBA, various means are used by producers to obtain and select cuttings. Producers obtain their cuttings in two (2) ways: 40% of those surveyed in the Niayes and 46.7% of those in the CNBA buy them and 60% and 53% respectively use self-production. Purchases were made from local producers, at the market or at institutes/NGOs/projects. 30% of the respondents in the Niayes, compared to 40% of those in the CNBA, buy from a local producer. 2.2% of the producers surveyed in the CNBA said they buy their cuttings at the market. However, 10% of those surveyed in the Niayes zone and 4.4% of those in the CNBA buy their cuttings from institutes/NGOs/projects. NB: The selection of cuttings for the following season is done well before planting. Indeed, after cutting selected cassava stems, producers keep them by burying them in a hole of not

too deep dimensions, depending on the number of cuttings, while waiting for the first rains.

**Cultivated varieties**

In the areas surveyed, producers grow only local varieties. A total of five were identified. These are: Soya, Wallet "Parydiey", Niaregui, Boss, Kombo and Terasse. These varieties take their names by analogy of some locality or thing. However, it should be noted that some grow only one variety in their plots while others combine two. Following these two criteria, two respective figures were designed. Fig 5 represents the relative value shares of producers growing a single variety on their plot. It shows that the Terasse and Kombo varieties are the most widely grown in the Niayes survey area, at 43% and 36% respectively, followed by Wallet and Niaregui, all in equal proportions (10%). In the north-central part of the groundnut basin, the Soya variety, used by 75% of producers, is the one that takes precedence over the others. This is followed by the varieties Parydiey "Wallet", grown by 20%, Kombo and Terasse, all used by 2.5% of those interviewed.

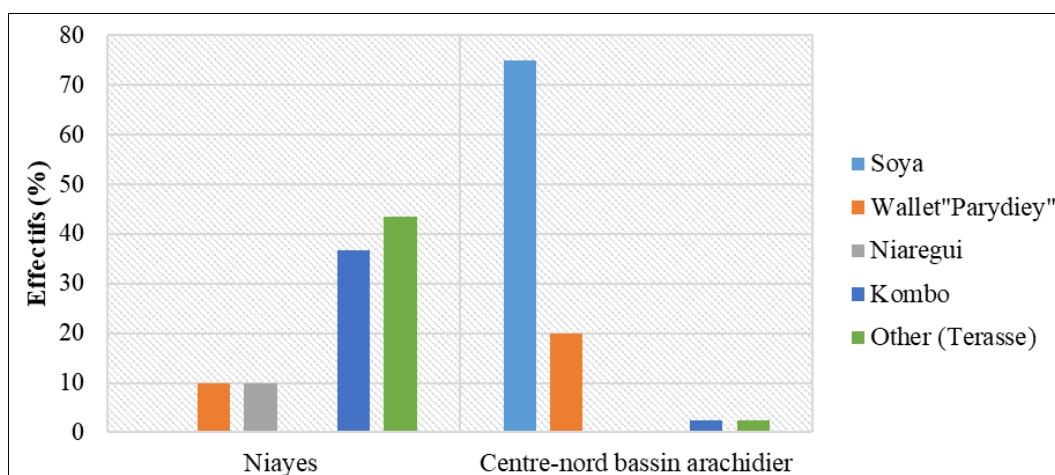


Fig 5: Proportion of farmers planting a cassava variety in their plots

Fig 6 presents the relative shares of producers who combine two cassava varieties in their plots. The analysis shows that in

the Niayes zone, the Parydiey-Terasse and Niaregui-Terasse associations are the most common. They are respectively cultivated by 40% and 20% of respondents. In the central-northern groundnut basin, 80% of producers surveyed use the

Soya variety in combination with the Wallet variety "Parydiey". The other 20% revealed the association of the Wallet-Kombo varieties.

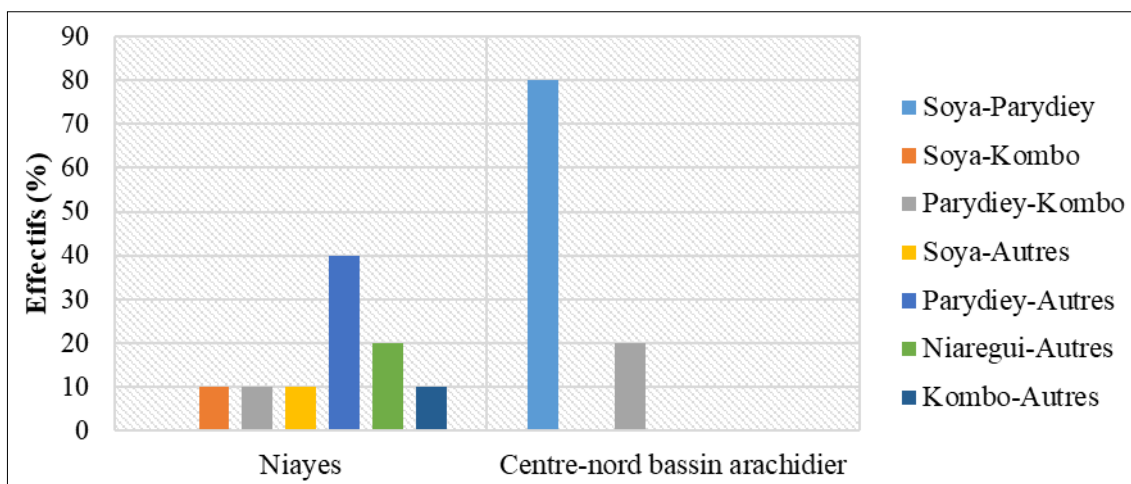


Fig 6: Proportion of producers planting two varieties of cassava in their plots

**Preparation of cuttings**

Producers were asked if they used chemical products as well as biologicals for the preparation of cuttings. Fig 7 shows the proportion of users of cuttings preparation products. It shows that 72.5% versus 91% of the producers surveyed in the Niayes and north-central groundnut basin zones do not use products for preparing cuttings. However, it should be noted

that in the Niayes zone surveyed, some producers use praline (12.5%), furadan (10%) and granox (5%). In the CNBA, 9% reported using furadan. It should also be noted that the producers carry out this preparation in the same way. In fact, the cuttings are all soaked in a water solution diluted with the product, regardless of their quantity.

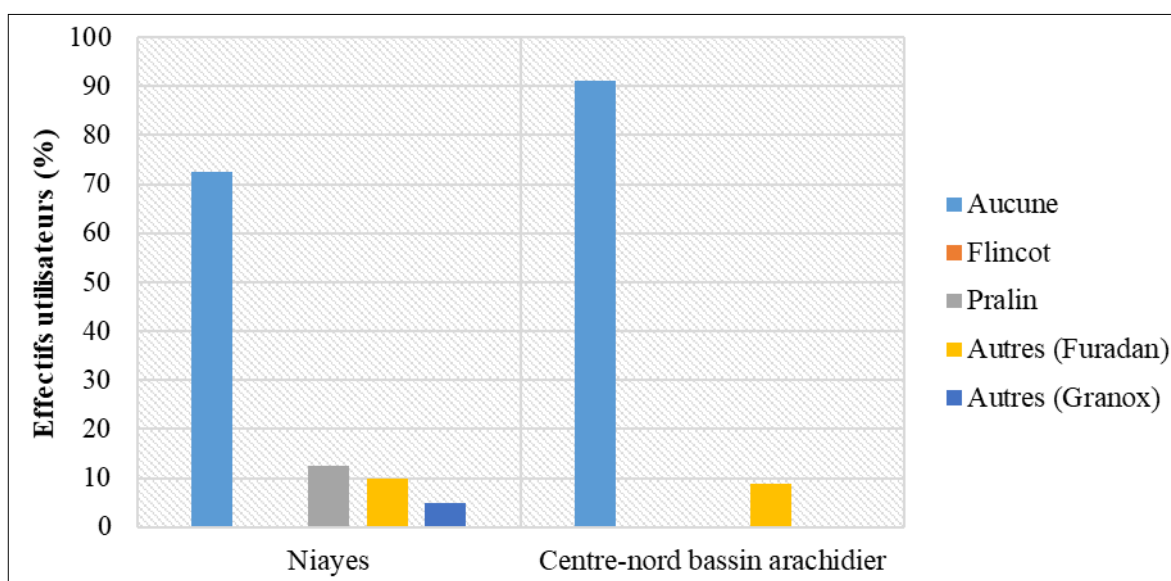


Fig 7: Proportion of users of plant protection products for the preparation of cuttings

**Soil amendment**

As background manure, cattle, horse and donkey manures are much more widely used by farmers, but are not quantifiable by them. Most apply it during the dry season well before planting. However, none of the interviewees reported doing any preventive soil treatment.

**Harvesting**

It includes several phases, namely: staking with the daba, digging up, piling up the dug-up plants and cutting the tubers.

**Harvesting method and period**

In these areas, the harvesting operation is carried out in the same way. Once the cassava plants have reached maturity, they are dug up and grouped into small piles within the plot. Because of its tediousness, the operation is mostly carried out by hired labor by the producer. The number of workers varies according to the size of the plot. However, most respondents reported hiring an average of seven laborers on a one-hectare plot.

**Average yields**

As shown in Fig 8 presenting the average yields of producers

of a variety obtained, when there is no loss, the best average yields are obtained with the varieties Kombo (12 months), Terrasse (12 months) and Niaregui ( $\geq 12$  months) compared to the others in the surveyed area of Niayes. They are in the order of 4,170 kg/, 4,488 kg/ha and 4,000 kg/ha. As for the CNBA, the best yields are obtained with the varieties Soya

(cycle: 8-10 months) and Wallet (cycle: 12 months), i.e., 8,900 kg/ha and 11,200 kg/ha respectively in the central-northern groundnut basin.

NB: The different average yields were calculated through weighing and the number of bags obtained on the cultivated area. Yields vary according to variety and cycle.

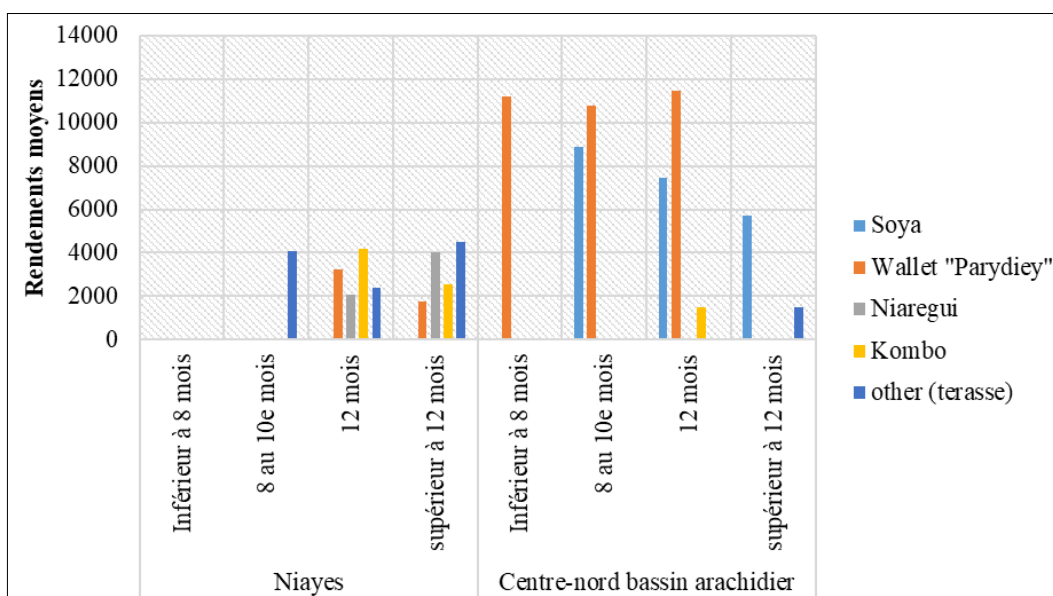


Fig 8: Average yields obtained by producers of a cassava variety

As for producers combining two cassava varieties in their plots, the results in Fig 9 show that in the Niayes zone, when there is no loss, the best yields of 6,430 kg/ha and 6,400 kg/ha were obtained respectively by respondents combining Soya-Terrasse and Parydiey-Terrasse. For the CNBA, producers growing Parydiey-Kombo had the highest yield, at 6,400 kg/ha, harvested between the 8th and 10th month.

Fig 1: Average yields obtained by producers of two cassava varieties

**Packaging**

In both areas, most of the packaging is done by the bag. Indeed, many of the respondents said they sell in bulk, with only a few saying they sell in detail. However, the bags differ in weight depending on the size of the cuttings. Fig 10 shows the different types of bag weights used for packaging and "backfilling" cuttings.

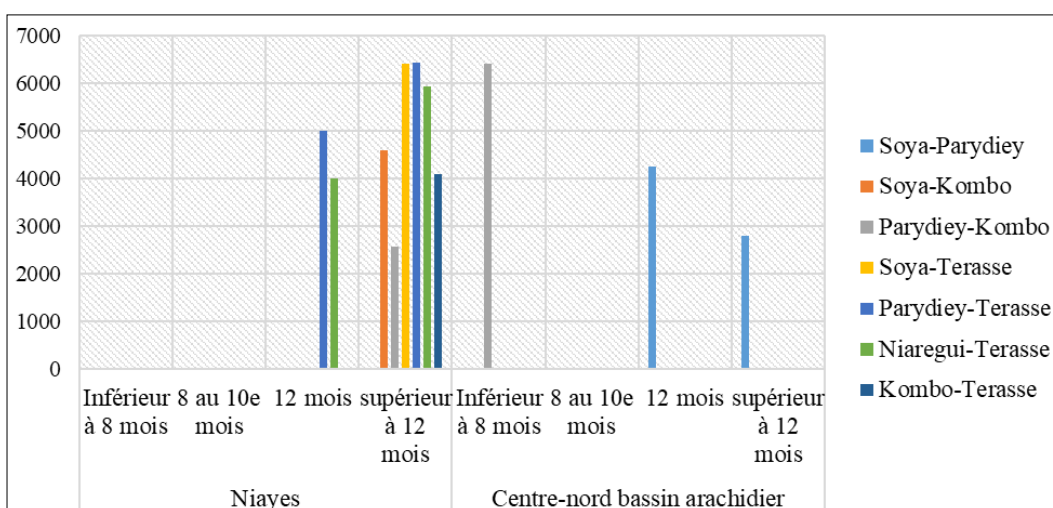


Fig 10: Approximate weight of bags for packaging

**Phytosanitary problems and control methods**

Questions on the phytosanitary problems encountered by producers of one and two varieties allowed us to calculate, among other things, the income from sales in case of losses.

**Phytosanitary problems**

**Main pests of cassava in the zones**

There are a plethora of cassava pests, but the main pests most commonly encountered by respondents in these areas are mealybugs, termites and millipedes (photo 3 below).



Presence of termite mound on tubers

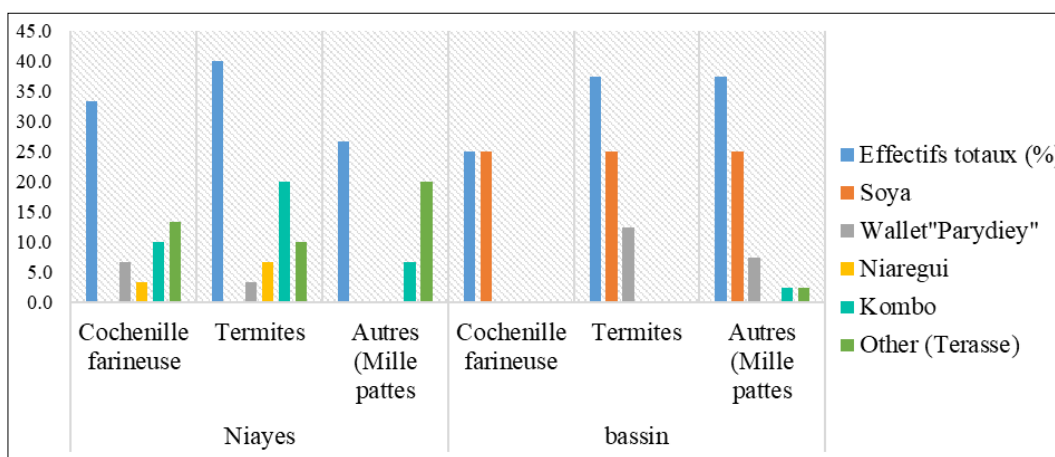
Mealybugs on cassava leaves

**Photo 1:** Photo of pests encountered by producers

A total of 33.3% of producers growing a single variety of cassava in the Niayes reported encountering mealy bugs in their plots, 40% reported encountering termites, and 26.7% reported encountering centipedes. As for those in the central-northern groundnut basin, the respective proportions are 25%, 37.5% and 37.5%. Among producers in the Niayes of two varieties, 30% reported encountering mealybugs, 40% termites, and 30% centipedes. In the CNBA, mealy bugs were encountered by 40% of respondents and termites by 60%.

Fig 11 presents the responses of producers concerning the pests encountered in their plots according to the types of varieties. With regard to mealybugs, 25% of soybean

producers in the north-central groundnut basin stated that they were present in their plots, although in the Niayes, the variety that seems to be most affected by mealybugs is Terasse, according to 13.3% of respondents. As for termites, 20% of those surveyed in Niayes said that they were attacking the Kombo and Soya varieties, according to 25% of those in the north-central groundnut basin. As for millipedes, 20 out of a total of 26.7% of producers interviewed in Niayes said that they attacked the Terasse variety more, while in the central-northern groundnut basin, 25% said that they attacked the Soya variety more.



**Fig 11:** Producers' responses on the sensitivity of the cultivated variety to pest attacks

Fig 12 presents the cassava pests encountered by producers who associate or grow two varieties. It shows that in 20% of cases, producers stated that the Niaregui-Terasse association is more attacked by mealy bugs in the Niayes, while 40% of those interviewed in the central-northern groundnut basin stated that the Soya-Parydiey association was more attacked. Regarding termites, they would attack all types of cassava

variety associations, 25% said they attacked Parydiey-Kombo, 25% Soya-Terasse, 25% Parydiey-Terasse and 25% Kombo-Terasse. Among respondents in the north-central groundnut basin, 40% said that termites attacked the Soya-Parydiey association more. As for the millipedes (iules), they attacked the Parydiey-Terasse association more, according to 20% of the respondents from the Niayes.

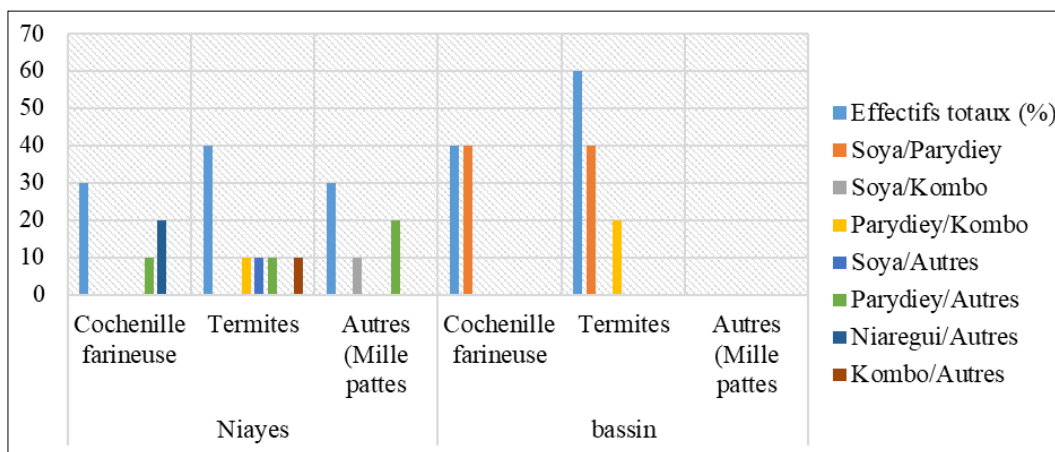


Fig 12: Producers' responses on the susceptibility of the two varieties grown to pest attacks

**Main diseases**

African mosaic, bacterial blight, and anthracnose are the main cassava diseases encountered respectively by producers of one and two varieties in these areas.

Fig 13 shows the frequency of responses collected from producers on the susceptibility of the variety grown to diseases. In fact, 33.3% of producers interviewed in the Niayes gave the variety Terasse as the one that was most susceptible to mosaic. As for the CNBA, 52.5% stated that the

Soya variety was the one most attacked by this disease. Bacteriosis was cited by 16.7% of respondents in the Niayes as the main disease affecting Kombo and by 2.5% of those in the CNBA as affecting Soya. Anthracnose is only present in the central-northern groundnut basin, with 2.5% of producers giving the Soya variety as the most susceptible to the disease. However, other producers in the central-northern groundnut basin (32.5%) and the Niayes (10%) declared that they had not yet encountered any diseases on the Niaregui varieties.

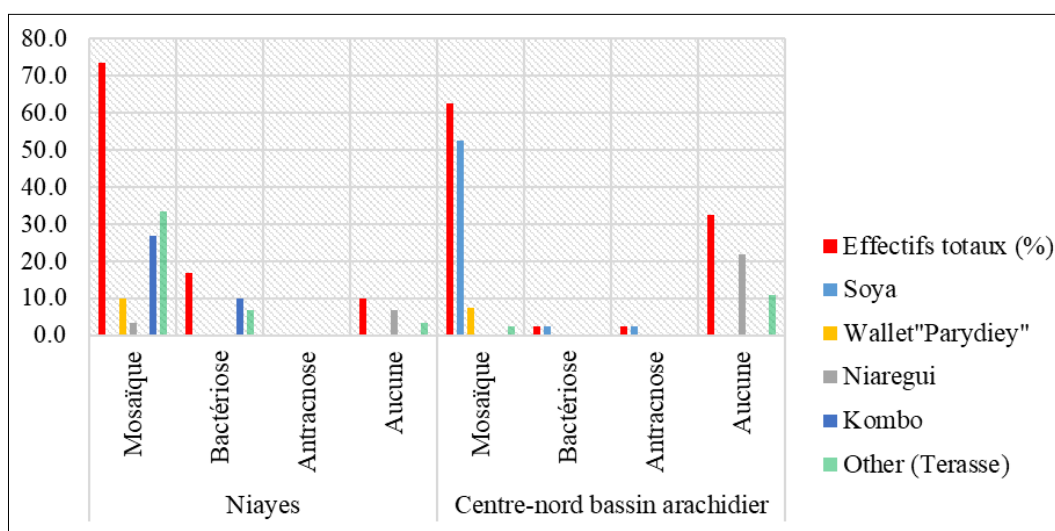
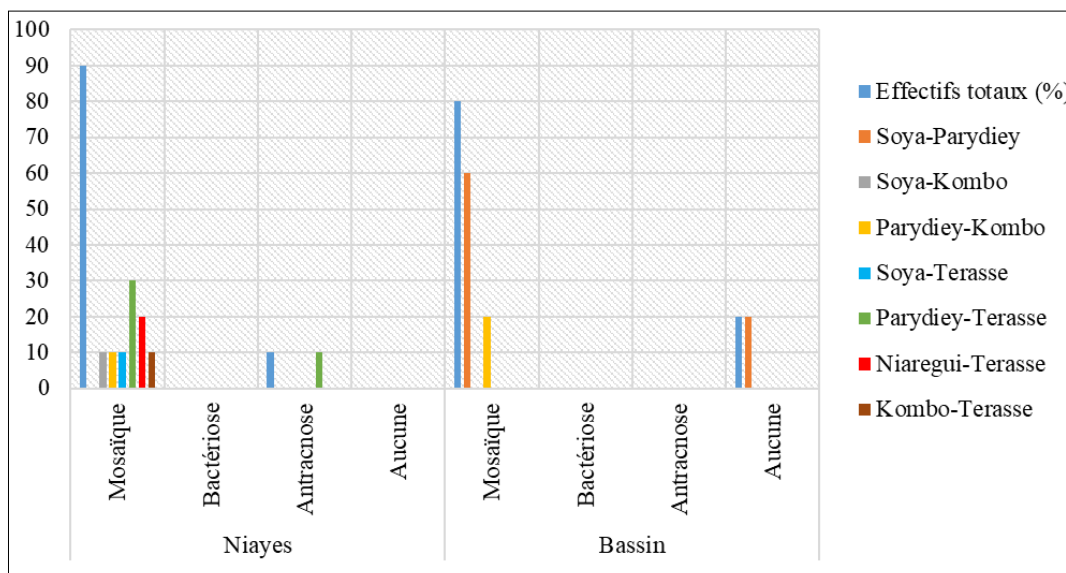


Fig 13: Producers' responses on the susceptibility of the variety grown in relation to the diseases encountered

Fig 14 presents the percentages of producers' responses on the sensitivity of the two varieties grown. It shows essentially that 30% of producers in the Niayes who combine the two varieties Parydiey-Terasse declared their sensitivity (of these two varieties) to mosaic and 10% to anthracnose. In the

central-northern groundnut basin, 60% of respondents who combined Soya and Parydiey were the only ones affected by mosaic disease. In both zones, bacterial blight was not encountered by producers of either variety.





**Fig 14:** Producers' responses on the susceptibility of the two varieties grown in relation to the main diseases encountered

### Control methods

Various methods are used by farmers to control these formidable pests of the cassava crop. As shown in Table 7, these are essentially mechanical and chemical. Indeed, 42.5% of the producers interviewed in the Niayes against 26.7% of those in the central-northern groundnut basin said they use the mechanical control method; a method that consists of digging up/cutting the attacked cassava plants. Chemical control was used by only 20% of respondents in the Niayes and 13.3% of those in the central-northern groundnut basin. Pesticides such as Granox, Furadan and Simathion are used by the latter, although the name of the active ingredient is sometimes unknown to the respondents. However, 37.5% versus 60% of the producers in these respective zones claim not to use either of these two methods.

**Table 2:** Control methods used by producers

Control methods	Niayes area	Center-north groundnut basin
Mechanical	42,5	26,7
Biological	0	0
Chemical	20	13,3
None	37,5	60

### Discussion

The results showed that farmers with one and two cassava plots are more numerous which can be accounted for by several facts. It's important to note that the producers surveyed do not only cultivate cassava. Because of the decline in cassava yields observed in recent years, producers do not hesitate to grow other crops as a means of diversification. In the Niayes area, for example, farmers are also growing crops such as eggplant, tomato, bissap and mango. In the north central part of the groundnut basin, groundnuts, millet and cowpeas are the other crops that provide income for farmers. With respect to the origin of cuttings for planting, the proportions of producers using self-produced cuttings are much higher than those of buyers in the surveyed areas of the Niayes and the north-central groundnut basin. The cuttings that appear to be healthy and vigorous are those used for planting. This is reflected in the lack of financial means of some of them, who claim that the cost of cuttings is expensive.

In terms of the choice of variety(ies) cultivated, the results

revealed that the local varieties Kombo and Terrasse are the most widely cultivated in the Niayes, while Soya is the most popular in the central-northern groundnut basin. The motivation for these choices stems from the fact that in the Niayes, the above-mentioned varieties, especially Terrasse, give good yields. In the central-northern groundnut basin, despite the low yields obtained with the Soya variety, producers still insist on using it. The choice is explained by the uniqueness of this variety in this zone, but also by the high cost of cuttings for the others. Our results are in line with those of [6], who found that Soya is the variety used by 90% of CNBA producers. The results also show that the Parydiey-Terrasse and Soya-Parydiey associations are the ones most used in the areas surveyed in the Niayes and the north-central groundnut basin, respectively. The explanation that could be given is that in the event of attacks, losses are not so considerable. It should be noted that this association of varieties has the advantage of maintaining soil fertility, thus allowing better productivity of the land (e.g., increased yields). However, not controlling it would lead to the phenomenon of competition (especially with the plant population) and would also make maintenance work difficult (weeding)...

Most producers stated that they do not use products for the preparation of cuttings for planting, due to a lack of financial means. These results are in line with those of [6], which showed that phytosanitary pre-treatment is carried out on average by 1/3 of the producers. As for the frequency of weeding, it differs according to the length of the cycle and varies from four to eight. The high frequency of weeding can be explained by the fact that some producers only harvest two years after planting. These results are out of step with those of [8, 5] for whom three weedings are sufficient for weed control. Mounding and ridging are not known operations in the zone, which explains their non-use.

The producers surveyed in these areas proceed directly with digging up after the cassava has reached maturity. These results are in complete contradiction with those of [5], which state that the stem should be cut 25 to 35 cm above ground before the tubers are pulled out. Harvesting time differs among producers. Some, for financial reasons, harvest even before the end of the cycle (maturity), while others, to obtain large tubers (and better yields), prefer to leave the plant a little

longer. These results are supported by those of [9], for whom the extension of crop cycles is also an alternative for producers to cope with the deficit of fertilizers.

The results of the approximate weights of the weighing bags used for packaging by the respondents revealed that many of them oriented their choices to the weighing bag estimated at 80kg. Such a choice would, on the one hand, attract customers or, on the other hand, result from buyers' preferences. These results are supported by [10], who believes that the appearance of the bag determines the success of the sale. According to farmers in the Niayes survey area, the varieties most attacked by mealy bugs, termites, and centipedes are Terasse and Kombo. In addition, the results revealed that the Soya and Parydiey varieties are the ones most attacked by these pests according to farmers in the central-northern groundnut basin. In fact, cuttings of the same varieties, which are self-produced, are replanted for several years, thus increasing the pest pressure and consequently decreasing resistance. These results are in line with those of [7], which showed that the Kombo, Wallet and Parydiey varieties were susceptible to pests such as termites.

Overall, mosaic appears to be the most common disease in these areas. It also revealed that the Terasse and Kombo, Soya and Niaregui varieties were more susceptible to diseases in the Niayes and CNBA zones, respectively. The explanation that could be derived from this analysis is that all of these varieties, with the exception of Terasse, have been cultivated for many years. Therefore, the pathogens will develop more and more as long as the environment is favorable to them. However, our results are not consistent with those of [6], which showed that the accessions (Soya, Niaregui, Kombo) produced in large quantities are those that best respond to production constraints such as disease resistance.

The analysis of the results revealed that many of the producers surveyed did not take action to combat phytosanitary problems. This was either due to a lack of resources on the part of the producers (as in the case of the CNBA), or to the inaccessibility of specific products.

### Conclusion and prospects

Through this study, we were able to show with the analysis of the cultivation practices of the cassava producers of these zones. We can also note that:

- Climate change, which must be taken into consideration even if cassava is relatively resilient. The decrease in rainfall noted in recent years can affect the productivity of cassava, which can certainly resist up to 500mm;
- The decrease in cultivable areas due to the inextensibility of land, leading to the impracticality of fallowing, rotation, etc.
- The depletion of mineral elements in the soil (low soil fertility) due to poor cultivation practices (e.g., non-respect of fertilization rates);  
However, given the results of this study, we propose the following perspectives:

### Concerning the State

Launching programs or projects for the creation and improvement of cassava varieties, so that new short-cycle varieties, at affordable prices, are subsidized for the benefit of producers;

Supporting Codepromat to revive cassava cultivation in the area; support to encourage, for example, the professionalization of producers, but also the processing of

cassava;

### Technical

Carry out diagnostic studies on the cassava value chain in Senegal in order to identify the actors involved and the main problems in order to propose sustainable solutions;  
to carry out awareness campaigns among farmers on the practice of rotation to reduce diseases or parasitic pressures;  
To practice crop association, given the lack of land, in order to maintain and/or improve yields (e.g. legumes + cassava) and techniques such as ridging.

### References

1. Aïchatou SSN. Etude comparative de « clones » de manioc (*Manihot esculenta* Crantz), selon leurs caractères agronomiques et leurs sensibilités aux ravageurs et maladies en zone sahéenne des Niayes, SENEGAL, Mémoire de DEA en Sciences de l'environnement, Université Cheikh Anta Diop, 2006, 72.
2. Badiane AN, Khouma M, Sène M. Gestion et transformation de la matière organique. Synthèse des travaux de recherches menées au Sénégal depuis 1945. Edition ISRA, novembre, 2000, 115.
3. Dièye MS. Impacts de la culture du manioc sur les sols dans la communauté rurale de Chérif Lo (Département de Tivaouane), Mémoire de Master II en Ressources Environnement et Développement (RED), Université Cheikh Anta Diop de Dakar, 2012, 141.
4. Dione M, Diop O, Dièye PN, Ndao B. Caractérisation et typologie des exploitations agricoles familiales, Tome 3, Bassin arachidier, 2008, p 8, p 9 et p 10.
5. Kouakou J, Nanga S, Plagne-Ismail C, Mazalo AP, Edoh KO. Production et transformation du manioc, CTA, PRO-AGRO, Yaoundé, Cameroun, 2015, p 5 et p 6.
6. Djiba S. Caractérisation des pratiques de culture du manioc dans la région de Thiès, Mémoire de master en Gestion Durable des Agro écosystèmes Horticoles, Université Cheikh Anta Diop de Dakar, 2017, 60.
7. Faye A. Etude comparative des variétés de manioc (*Manihot esculenta* CRANTZ) selon leur sensibilité aux termites ravageurs des boutures dans le département de Tivaouane (Sénégal) et leurs capacités organogénétiques *in vitro*, Sénégal, Mémoire de DEA en Sciences et Techniques spécialité Production et Protection des Végétaux, Université Cheikh Anta Diop de Dakar, 2016.
8. Mahungu NM, Tata Hangy KW, Bidiaka SM, Frangoie A. Multiplication de matériels de plantation de manioc et gestion des maladies et ravageurs. Manuel de formation destiné aux agents de terrain. IITA, 2014, 44.
9. Mvoulatsieri M, Foahom B, Mbou S, Sonwa D, Moundzeo L. Dates de plantation et de récolte des variétés de manioc dans la vallée du Niari (Congo). African Crop Science. 2012;20:603-612.
10. Nuz L. Stratégies d'adaptation sociale et technique pour faire face à la crise agricole dans le nord du bassin arachidier, Sénégal, Mémoire de master. Centre National d'Etudes Agronomiques des Régions Chaudes. (CNEARC), 2004, 159.