

PUBLICATION SCIENTIFIQUE 1

1-

Auteurs : Diomandé Souleymane, Yao Akoua Clémentine, Mangara Ali, Bakayoko Adama

Année : 2018

Titre : Weeds in the vegetable garden of the town of Gagnoa (Côte d'Ivoire)

Référence : 11(4), pp. 49-59

2-

Nom du journal : Journal of Agriculture and Veterinary Science (JAVS).

Année : 2018

Page de publication : 49-59

3-

Editeur : Organisation International de la recherche scientifique

ISSN : 2319-2380 / 2319-2372

Impact Factor : 3.26

Lien du journal : www.iosrjournal.org

Lien de l'article : <https://www.iosrjournals.org/iosr-javs/papers/Vol11-issue4/Version-1/I1104014959.pdf>

4-

Bases de données d'indexation : Copernicus, Google Scholar, ResearchGate, Semantic Scholar, Scilit, ScienceGate, Indian Citation Index (ICI), arXiv.org, Crossref.

IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)

Managing Editor Board

- ✦ Dr. Arif Habib, India
- ✦ Dr. Ashraf Mohamed Abdel Rahman Abu-Seida, Egypt
- ✦ Dr. Ashlagader Saleh Ali, Libya
- ✦ Dr. Ali Nayyef Asai, Iraq
- ✦ Dr. Dr. Shahid Hussain Sheikh, Pakistan
- ✦ Dr. Aaijaz Ahmed Khan, Malaysia

International Editorial Board

- ✦ Dr. Bhavna Dave, India
- ✦ Dr. Nandita Pal, India
- ✦ Dr. R J Rao, India
- ✦ Dr. Noha, Egypt
- ✦ Dr. V Prenchandras Singh, India
- ✦ Dr. Anshu Gupta, India
- ✦ Dr. Prabudh Goel, India
- ✦ Dr. Nagwa Abd el fadeel Abd el Hamid, Egypt
- ✦ Dr. Jugal Kishore, India
- ✦ Dr. Vinod Kumar Singh Gautam, India
- ✦ Dr. Rahamath Khan, Libya
- ✦ Dr. Azmat Alam Khan, India
- ✦ Dr. Sunil Vyas, India
- ✦ Dr. Wael Abouelwafia, Egypt
- ✦ Dr. Durgesh Nagesh Barloor, India
- ✦ Dr. Moshak, Iraq
- ✦ Dr. K. Loganathasamy, India
- ✦ Dr. Sunanda Sharma, India

Contact Us

Website URL : www.iosrjournals.org
Email : iosrjournals@gmail.com
Support@iosrmail.com





Qatar Office:

IOSR Journals
Salwa Road
Near to KFC and Aziz
Petrol Station,
DOHA, Qatar

India Office:

IOSR Journals
SC-89 A, Shastri Nagar,
Ghaziabad, UP,
India

Australia Office:

43, Ring Road,
Richmond Vic 3121
Australia

New York Office:

8th floor, Straight hub,
NS Road, New York,
NY 10003-9595



IOSR Journals
International Organization
of Scientific Research

e-ISSN : 2319-2380 Volume : 11 Issue : 4 (Version - I) p-ISSN : 2319-2372

IOSR-JAVS

Contents:

A Non-Parametric Method of Assessing the Yield Stability Using Principal Coordinate Analysis	01-06
Detection of PR Genes Resistant To Meloidogyne spp. Which Causes Root - Knot Nematode Disease on Hybrid Tomato Plants	07-14
Impact of Lot Quality Assurance Sampling (LQAS) For Better Monitoring & Evaluation (M&E) In Agriculture and Rural Development Projects	15-22
Analysis of C-Organic, Nitrogen, Phosphorus and Potassium in Application Areas and Without Application of Palm Oil Mill Effluent	23-27
Acute Hemotropic Mycoplasmosis Of Newborn Calves In Basrah, Iraq	28-33
Effects of Nitrogen and Sulphur On Brassica Juncea (Cv. Caliente 199) Used for the Biofumigation of Potato Cyst Nematodes (Globodera pallida (L.))	34-38
Effect of Variety and Seed Dressing On Incidence and Severity of Cercospora Leaf Spot Disease of Cowpea (Vigna Unguiculata) In Sokoto, North-Western Nigeria	39-44
Stabilisation of Vertebral Fracture - Luxations with Polymethyl methacrylate (PMMA) and Stainless Steel Wire In Cats	45-48
Woods In The Vegetable Garden of The Town of Gagnoa (Côte d'Ivoire)	49-59
The Prevalence of Human African Trypanosomiasis In Maiduguri, Nigeria.	60-63
Sheep And Goat Marketing: Panacea To Poverty Alleviation In Akinleye Local Government Area of Oyo State Nigeria	64-67
Economic Efficiency of the Okra Crop Farms in Baghdad Governorate - Eastern Karrada (Application Model) in the summer season of 2016.	68-72
Hematological Responses Of Replacement Levels Of Cassava Peels And Maize As Energy Sources In Broiler Diets.	73-77
Analysis of The Tracheobronchi of Hedge Hog: Histomorphometric Studies	78-85

All Papers are indexed in Index Copernicus

Preuve d'indexation

INDEX COPERNICUS
INTERNETIAE

ICI World of Journals

ICI Journals Master List

ICI World of Papers

Contact

Login/ Register



ICI World of Journals / IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) / Issues and contents

Back



Journal title: [IOSR Journal of Agriculture and Veterinary Science \(IOSR-JAVS\)](#) 

ISSN: 2319-2372 (print), 2319-2380 (online)

GLCID: [n/d](#)

Country / Language: IN / [EN](#)

Publisher: International Organization of Scientific Research

Citation: [C/S](#)

MEiN: [N/D](#)



Predatory Alert!

Deposited publications: 264 > Full text: 41% | Abstract: 99% | Keywords: 100% | References: 0%

2019 >

2018 >

Language

All

Title of the publication



IOSR Journals

International Organization
of Scientific Research

IOSR Journal of Agriculture and Veterinary Sciences

e-ISSN : 2319-2380

Volume : 11 Issue : 4 (Version - I)

p-ISSN : 2319-2372

IOSR-JAVS

Contents:

A Non-Parametric Method of Assessing the Yield Stability Using Principal Coordinate Analysis	01-06
Detection of Mi Genes Resistant To Meloidogynespp, Which Causes Root - Knot Nematode Disease on Hybrid Tomato Plants	07-14
Impact of Lot Quality Assurance Sampling (LQAS) For Better Monitoring & Evaluation (M&E) In Agriculture and Rural Development Projects	15-22
Analysis of C-Organic, Nitrogen, Phosphorus and Potassium In Application Areas and Without Application of Palm Oil Mill Effluent	23-27
Acute Hemotropic Mycoplasmosis Of Newborn Calves In Basrah, Iraq	28-33
Effects of Nitrogen and Sulphur On Brassica Juncea (Cv. Caliente 199) Used for the Biofumigation of Potato Cyst Nematodes (<i>Globodera pallida</i> (L.))	34-38
Effect of Variety and Seed Dressing On Incidence and Severity of Cercospora Leaf Spot Disease of Cowpea (<i>Vigna Unguiculata</i>) In Sokoto, North-Western Nigeria	39-44
Stabilization of Vertebral Fracture - Luxations with Polymethyl methacrylate (PMMA) and Stainless Steel Wire In Cats	45-48
Weeds In The Vegetable Garden of The Town of Gagnoa (Côte d'Ivoire)	49-59
The Prevalence of Human African Trypanosomosis In Maiduguri, Nigeria.	60-63
Sheep And Goat Marketing: Panacea To Poverty Alleviation In Akinyele Local Government Area of Oyo State Nigeria	64-67
Economic Efficiency of the Okra Crop Farms In Baghdad Governorate - Eastern Karrada (Application Model) in the summer season of 2016.	68-72
Hematological Responses Of Replacement Levels Of Cassava Peels And Maize As Energy Sources In Broiler Diets.	73-77
Analysis of The Tracheobronchi of Hedge Hog: Histomorphometric Studies	78-85

Weeds In The Vegetable Garden of The Town of Gagnoa (Côte d'Ivoire)

Diomandé Souleymane¹, Yao Akoua Clémentine¹⁻²,
Mangara Ali¹ et Bakayoko Adama¹⁻²

¹UFR Sciences de la Nature/ Université Nangui-Abrégoua/Abidjan, Côte d'Ivoire

²Centre Suisse de Recherches Scientifiques en Côte d'Ivoire (CSRS)/ Abidjan, Côte d'Ivoire

Corresponding Author: Diomandé Souleymane1

Abstract: Côte d'Ivoire is a predominantly agricultural country like many developing countries. However, farmers, the main players in this sector of activity, are supported by a major concern, which is the management of weeds. Indeed, these weeds are in direct competition with the cultivated plants and this causes a considerable decrease in productivity. Thus, to put in place an effective management of weeds, one needs to have a thorough knowledge of these species, in particular their floristic composition, their diversity and their ecology. The objective of this study is to inventory the weeds and identify the control methods mainly used against these plant species. To carry out this study, we carried out a semi-structured survey associated with surface surveys in order to gather information on the weeds. The results of the study showed that the most aggressive weeds against vegetable gardens are *Amaranthus viridis*, *Dactyloctenium aegyptium*, *Digitaria horizontalis* and *Phyllanthus amarus* and the most harmful species are *Cyperus rotundus*, *Phyllanthus amarus* and *Ageratum conyzoides*. Chemical control and manual control are the methods commonly used by gardeners to control weeds in their gardens. The floristic inventory identified 14 plant species. These species are divided between 14 genera and 8 families. The families of Poaceae, Compositae and Cyperaceae are the most represented.

Keywords : Vegetable gardens, weeds, inventory, wrestling, Gagnoa

Date of Submission: 16-04-2018

Date of acceptance: 04-05-2018

I. Introduction

The boundaries between cities and farmland are becoming blurred¹. At the same time, homes are growing with the increasing desire of the population to be closer to nature and to grow food plants in order to find the pleasure of eating more fresh and healthier¹. Allotment gardens or kitchen gardens meet all of these needs. In addition, beyond their food functions, these gardens have other functions. In France, vegetable plots have a tourist utility with more than 700,000 visitors per year² and an ornamental function³. In Côte d'Ivoire, in particular, vegetable plots are practiced primarily for food and economic purposes. This is the case of the kitchen gardens of N'Ganon and Nangoukaha, in northern Côte d'Ivoire, which provide school canteens in these villages with local food and of quality⁴. These gardens are therefore a real source of food for the populations because their productions allow the producers to provide for the needs of their families. For the prisoners, the vegetable plots offer the possibility to eat the products more fresh and allow to know the pleasure of the work, far from the constraints of the prison.

However, vegetable plots, in general, are faced with a major difficulty which is the presence of self-propagating plants called weeds. Weeds have always been an important nuisance for all types of agriculture, except those above ground. The heat and redundancy of the rains during the farming season favor the development of these self-propagating plants⁵. They are the direct competitors of the cultivated plants. Indeed, crop self-propagating plants are responsible for 5% of crop losses in temperate areas and more than 25% in tropical areas⁵. They are a major obstacle to the development and production of crops⁶.

Weed management is a major concern for farmers. Thus, to put in place an effective management of self-propagating plants, we need to have a thorough knowledge of these species, in particular their floristic composition, their diversity and their ecology. This approach leads to a precise knowledge of the ecological and agronomic factors that will influence the development of species or self-propagating plants communities^{7,8}. As a result, it becomes possible to act on these factors to control the grassing over of a plot.

In order to provide an answer to all these difficulties faced by farmers, several studies have been carried out. This is the case of studies carried out by⁹ on the inventory of self-propagating flora in pineapple cultivation in the town of Bonoua in the south of Ivory Coast. Other studies, such as those carried out by¹⁰ on the ecological impact of glyphosate resistant transgenic maize crop simulation; the study on the repetitive effect of a herbicide treatment on self-propagating plants flora in Côte d'Ivoire; those carried out by¹¹ on the aspect of grass encroachment dynamics by *Euphorbia heterophylla* L. (Euphorbiaceae) and the study carried out by¹² on the

biology and ecology of *Euphorbia heterophylla* L. (Euphorbiaceae) in cotton culture , in the north of Cote-d'Ivoire. However, few studies exist on self-propagating plants in vegetable plots. During the preliminary investigations carried out, no weed study was found in vegetable plots in Côte d'Ivoire, particularly in the town of Gagnoa. The present study aims, in general, to know the weeds of the vegetable plots of the city of Gagnoa and the means of struggle practiced by the gardeners to fight these harmful species.

II. Study Environment

This study was conducted in Gagnoa (Figure 1), a city located in the GOH region in west-central of Côte d'Ivoire on the road link Abidjan-Issia, 85.7 km after Divo. The town of Gagnoa is located between latitudes 5 ° 55'and 6 ° 15'Nord and longitudes 6 ° 00'and 6 ° 30'West. With a surface area of 160 km², it is bounded to the north and west respectively by the departments of Sinfra and Issia. In the south and the east, we have the departments of Lakota and Oume. The soils of the commune of Gagnoa are of sandy-clay texture¹³. This town is rich in shallows, with alluvial deposits whose dominant composition is clay-silty¹³.



Fig 1: Location of the vegetable plots studied in the city of Gagnoa

III. Material And Methods

The material used consists of weeds, newsprint, plastic bags, tape and survey sheets (Appendix 1). The study began with field visits and preliminary surveys of gardeners, which resulted in the selection of sites for the study. Out of a total of 22 kitchen gardens visited, eight were selected (Table 1) on the basis of their surface area, the availability of gardeners and the relevance of the information collected. The study took place between June and September 2013.

Surveys were conducted among gardeners spread over all the study plots. They focused on:

- the proliferation mode;
- the methods and frequencies of maintenance of the plots;
- species of special concern;
- the usefulness of gardening.

Following these surveys, floristic surveys were carried out. The observations were made in plots of culture subdivided into square plots of 1m² arranged on contiguous ridges. The delimitation of the observation surfaces was inspired by the floristic studies of^{9,12,14,15}. Within each plot, the inventory of self-propagating plants was carried out. The data collected were analyzed using qualitative and quantitative approaches.

The qualitative floristic analysis allowed to define the composition of the adventitious flora of the cultures of the zone of study. It also made it possible to determine the fragmentary floristic richness, the index of floristic diversity, the coefficient of similarity and the biological types.

The quantitative floristic analysis allowed to define the agronomic importance of the different species taking into account their relative frequency and their average abundance/dominance¹⁶. The infestation diagram is represented by the positioning of the species on a graph where the relative frequency of the species in a survey set is plotted on the abscissa and their mean abundance-dominance is plotted on the y-axis. It allows to differentiate groups of species according to their degree of infestation, therefore of their agronomic importance. The abundance index used is the abundance index - average dominance. This gives the species a similar weight in the graph and makes it easy to define the sectors corresponding to the different groups¹⁷. Different authors have shown that there is a good correlation between the frequency and abundance of species¹⁸.

For the unknown species, samples were collected and a herbarium was set up for identification. The identification was made thanks to illustrated flora and the help of some specialists. Sites such as African Plant Database, Plant List and malherbologie.Cirad.fr have made it possible to update the names of species and botanical families. Species identity has been confirmed at the National Floristic Center of Félix Houphouët-Boigny University.

Table 1: Characteristics of the eight kitchen gardens visited

Districts	Vegetable plots	Surface area (m ²)	Crops
Amani	JA	214	<i>Capsicum annum</i> (chilli)
			<i>Lactuca sativa</i> (Salad)
			<i>Solanum melongena</i> (Aubergine)
Commerce	JCHR	288	<i>Capsicum annum</i> (chilli)
			<i>Lycopersicon esculentum</i> (Tomato)
			<i>Solanum melongena</i> (Aubergine)
	JYS	446	<i>Zea mays</i> (Maïze)
			<i>Brassica oleracea</i> (Cabbage)
			<i>Capsicum annum</i> (Chilli)
Nairaiville	JP	203	<i>Solanum melongena</i> (Aubergine)
			<i>Brassica oleracea</i> (Cabbage)
			<i>Zea mays</i> (Maïze)
	JK	159	<i>Capsicum annum</i> (chilli)
			<i>Solanum melongena</i> (Aubergine)
			<i>Zea mays</i> (Maïze)
Soleil	JG	257	<i>Brassica oleracea</i> (Cabbage)
			<i>Capsicum annum</i> (Chilli)
			<i>Solanum melongena</i> (Aubergine)
	JPC	511	<i>Zea mays</i> (Maïze)
			<i>Brassica oleracea</i> (Cabbage)
			<i>Capsicum annum</i> (Chilli)
Soleil	JECR	352	<i>Solanum melongena</i> (Aubergine)
			<i>Zea mays</i> (Maïze)

JA : Famille Amani ; JCHR : Centre Hospitalier Régional ; JYS : Famille Yacouba Sylla ; JP : Maison du PDCI ; JK : Famille Kouhon ; JG : Place Gbagbo ; JPC : Prison civile ; JECR : Ecole Christ Roi

IV. Data Processing

To facilitate the analysis and processing of the data, the name of the plant species has been redefined according to the principle of Bayer's codification¹⁹. According to this method, the first three letters are associated with the first two letters of the specific epithet.

Absolute frequency (Fa) :

The absolute frequency of each species (Fa) is equal to the total number of its occurrences in all the surveys made.

Relative frequency (Fr) :

Frequency of a given plant species as defined by the ratio of its absolute frequency (Fa) to the total number of surveys (Nr) performed at a given site²⁰.

It results in the following expression :

$$Fr = \frac{Fa}{Nr}$$

Fa = absolute frequency

Nr = the total number of surveys

This value is frequently expressed as a percentage; it is called a centesimal frequency :

$$Fr (\%) = \frac{Fa}{Nr} \times 100$$

Specific diversity index:

This index reflects the state of diversity of the flora of the study environment. It is expressed as follows :

$$Ids = \frac{E}{G}$$

E = Number of species

G = Number of types

Coefficient of similarity (Cs):

The similarity coefficient permits to establish the similarity between flora from the different sites in the locality of the study. It was calculated from the formula of²¹, reported by^{22,23} and is expressed as follows:

$$Cs = \frac{2c}{a + b} \times 100$$

a and **b** represent the lists of the species recorded respectively in the two sampling units that we want to compare, and **c** the number of species common to both lists **a** and **b**. According to this formula, the value of the similarity coefficient (CS), expressed as a percentage, varies between 0 and 100%, depending on whether the two lists have totally different floristic compositions (in this case, they do not include any common species and **c** = 0) or are strictly identical (then we have **a** = **b** = **c**). When the similarity coefficient is greater than or equal to 50%, the two environments are considered floristically similar.

Average Dominance Abundance Index: The average abundance of a species in a set of surveys is represented by its average abundance / dominance index, AD avg (e). This is the average of the abundance / dominance indices of the species AD (e), calculated in relation to the number of surveys in which the species is present Fa (e).

$$A/Dmoy(e) = \frac{\sum A/D (e)}{Fa(e)}$$

where : $\sum A / D (e)$ is the sum of the abundance-dominance of a species in all surveys
Fa (e) is the absolute frequency of the species

V. Results

Floristic richness

The adventitious flora established from the 58 surveys carried out consists of 14 species distributed among 14 types and belonging to eight families. Dicotyledons and Monocotyledons are each, represented by seven species, ie 50% per class (Table 2). Of all the families surveyed, three are dominant because they account for 64% of all species. They are in order of importance, Poaceae (36%), Compositae and Cyperaceae with 14% each (Figure 2). In the study sites, each inventoried species is represented by a single type (Ids = 1).

Table 2 : List of weeds species

Plants' codes	species	Class	types	Families
<i>Amasp</i>	<i>Amaranthus viridis</i> L.	D	<i>Amaranthus</i>	Amaranthaceae
<i>Ageco</i>	<i>Ageratum conyzoides</i> (L.) L.	D	<i>Ageratum</i>	Compositae
<i>Spiul</i>	<i>Spilanthes uliginosa</i> Sw.	D	<i>Spilanthes</i>	
<i>Cypro</i>	<i>Cyperus rotundus</i> L.	M	<i>Cyperus</i>	Cyperaceae
<i>Kyler</i>	<i>Kyllinga erecta</i> Schumach.	M	<i>Kyllinga</i>	
<i>Euphe</i>	<i>Euphorbia heterophylla</i> L.	D	<i>Euphorbia</i>	Euphorbiaceae
<i>Mimpi</i>	<i>Mimosa pigra</i> L.	D	<i>Mimosa</i>	Fabaceae
<i>Phyam</i>	<i>Phyllanthus amarus</i> Schumach & Thonn.	D	<i>Phyllanthus</i>	Phyllanthaceae
<i>Brala</i>	<i>Brachiaria lata</i> (Schumach.) C.E. Hubb.	M	<i>Brachiaria</i>	
<i>Dacae</i>	<i>Dactyloctenium aegyptium</i> (L.) Willd.	M	<i>Dactyloctenium</i>	
<i>Digho</i>	<i>Digitaria horizontalis</i> Willd.	M	<i>Digitaria</i>	Poaceae
<i>Penpo</i>	<i>Pennisetum polystachion</i> (L.) Schult.	M	<i>Pennisetum</i>	
<i>Stela</i>	<i>Steinchisma laxum</i> (Sw.) Zuloaga	M	<i>Steinchisma</i>	
<i>Porol</i>	<i>Portulaca oleracea</i> L.	D	<i>Portulaca</i>	Portulacaceae

D : Dicotyledon ; M : Monocotyledon

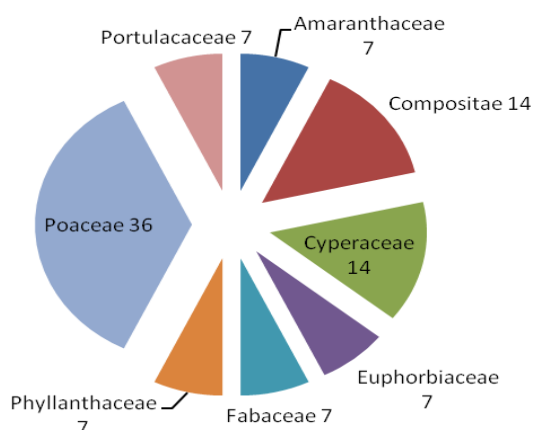


Fig 2: Percentage of self-propagating plants families identified

Plot floristic wealth: Out of the 58 surveys, the average number of species obtained per survey is 9.26. The floristic richness at the plot scale varies from 8 to 14 per survey (Figure 3).

The vegetable plot of the Civil Prison (JPC) has the highest plot of land of floristic wealth with 14 species. With eight species, the vegetable plots JCHR, JP and JYS have the lowest floristic wealth. As for other gardens, there are two that contain 10 species (JECR and JK) and the other sites contain 9 and 11 species. These are respectively the JA and the JG (Figure 4).

Coefficient of similarity: Taking into account the 50% threshold for determining floristic homogeneity, the analysis in Table 3 indicates that the self-propagating flora of the study area is floristically similar because their similarity coefficient is greater than 50%. Indeed, it is between 73 to 95%.

Biological types: The self-propagating flora of Gagnoa's vegetable plots belongs to 4 biological types which are Therophytes, nanophanerophytes, geophytes and hemicryptophytes. The best represented biological types are Therophytes, represented by eight species, ie 57.14%, followed by nanophanerophytes with three species, ie 21.43% (Figure 5 and Table 5).

Degree of self-propagating nuisance

Relative frequencies: The analysis of the relative frequency of species (Table 5) shows 5 classes of species. The species whose frequency is between 80 and 100% (class V) are six in number. These are *Cyperus rotundus* (100%), *Dactyloctenium aegyptium* (89.66%), *Pennisetum polystachion* (91.38%), *Phyllanthus amarus* (100%), *Portulaca oleracea* (84.48%) and *Steinchisma laxum* (96.55%). Class IV (between 60 and 80%) contains three species: *Ageratum conyzoides* (68.97%), *Brachiaria lata* (67.24%) and *Digitaria horizontalis* (62.07%). Class III (40 to 60%) contains 2 species: *Amaranthus spinosus* (58.62%) and *Mimosa pigra* (44.83%). As for the species *Euphorbia heterophylla* (27.59%), it belongs to class II (20 to 40%). Relative frequencies below 20% (class I) include 2 species that are *Kyllinga erecta* var *erecta* (17.24%) and *Spilanthes uliginosa* (17.24%).

Infestation diagram: The surveys carried out revealed 5 groups of species (Figure 6). These different groups (Table 4) reflect the potential for harmfulness and the agronomic importance of weeds:

- Group 1 (G1) gathers general major weeds. These are the most harmful species of crops. This group is represented by: *Ageratum conyzoides*, *Cyperus rotundus* and *Phyllanthus amarus*. Their great capacity of adaptation to the environment confers them a potential of important invasion of the plot.
- Group 2 (G2) is that of general potential weeds. It is represented by *Dactyloctenium aegyptium* which is a ubiquitous weed whose degree of infestation is less than that of the representatives of group 1.
- Group 3 (G3), represented by *Brachiaria lata*, *Digitaria horizontalis*, *Pennisetum polystachion*, *Portulaca oleracea* and *Steinchisma laxum*. These species are present in almost all surveys with an average abundance of less than 1.25 and a relative frequency greater than 50%. They are general weeds.
- Group 6 (G6) counts so-called regional weeds. In this group we note *Euphorbia heterophylla* and *Mimosa pigra*.
- Group 9 (G9) includes minor weeds. These are non-harmful species. They are represented by *Kyllinga erecta* and *Spilantes uliginosa*.

VI. Methods Of Control

The manual method is the most used by gardeners (Table 6). In fact, 50% of them only practice manual control, while 12.5% only engage in chemical control. When other gardeners, 37.5%, they combine the two methods of struggle (manualachemical).

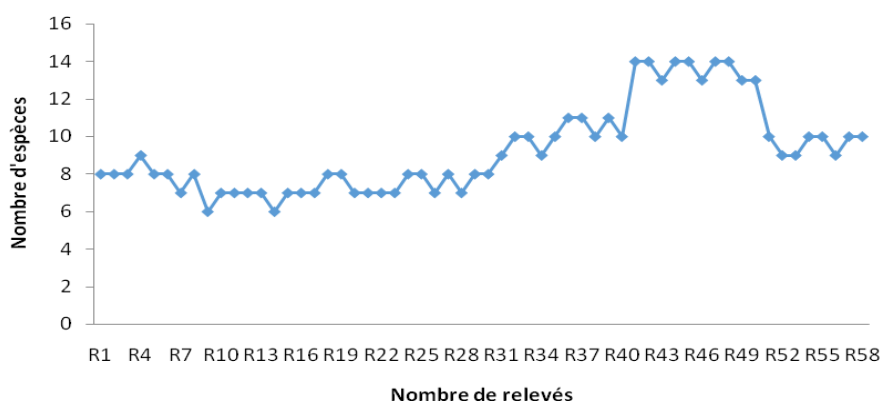


Fig 3: Floristic wealth by survey

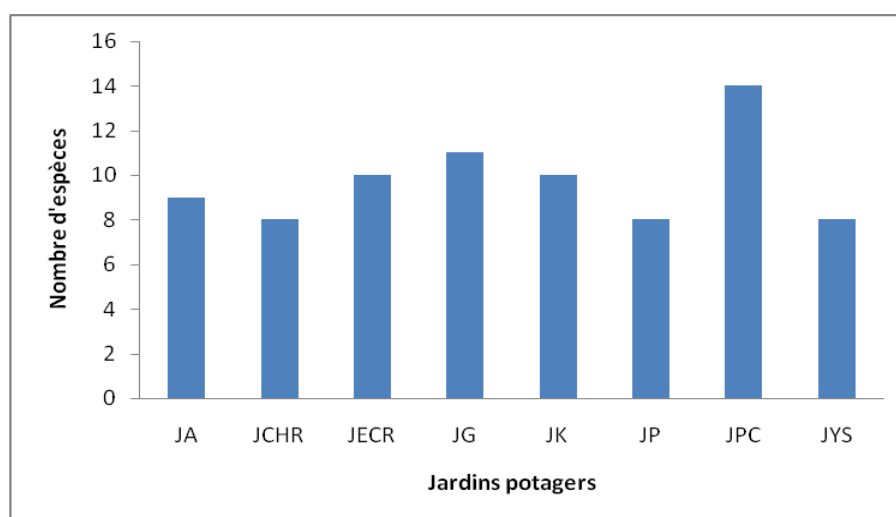


Fig 4: Plot floristic richness

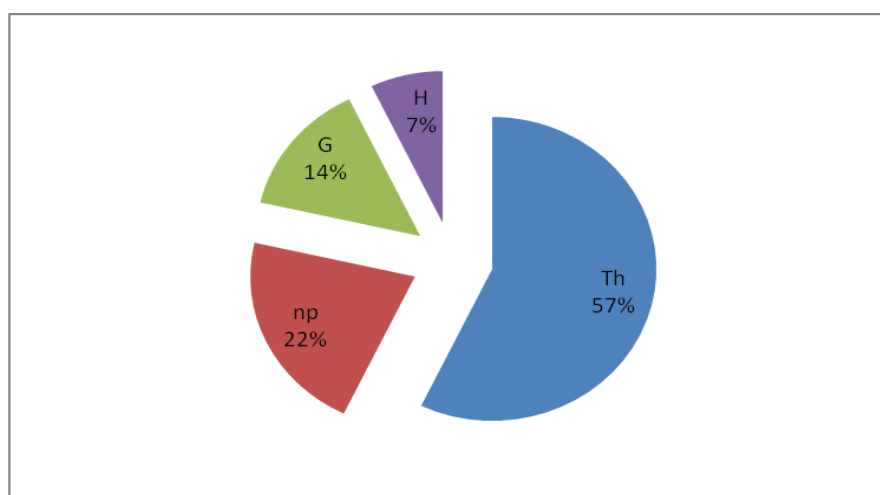


Fig 5: Biological type of species

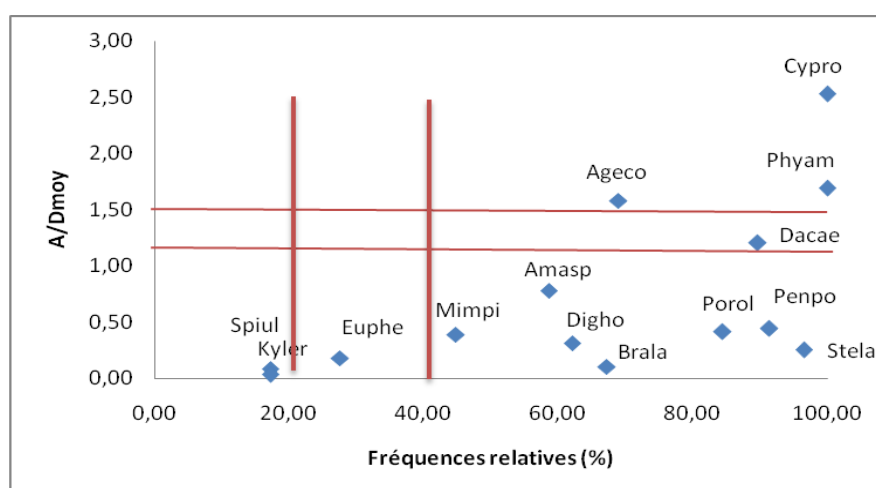


Fig 6: Infestation diagram of self-propagating plants in Gagnoa's vegetable plots

Table 3: Coefficient of similarity

Sites	JA	JCHR	JECR	JG	JK	JP	JPC	JYS
JCHR	0.82							
JECR	0.84	0.89						
JG	0.90	0.84	0.95					
JK	0.95	0.89	0.90	0.95				
JP	0.82	0.75	0.78	0.74	0.78			
JPC	0.78	0.73	0.83	0.88	0.83	0.73		
JYS	0.82	0.86	0.89	0.84	0.78	0.75	0.73	-

Table 4: Species by frequency class and corresponding biological types

frequency	species	Relative Frequencies (%)	TB
V (80 to 100 %)	<i>Cyperus rotundus</i>	100	G
	<i>Phyllanthus amarus</i>	100	np
	<i>Steinchisma laxum</i>	96,55	Th
	<i>Pennisetum polystachion</i>	91,38	np
	<i>Dactyloctenium aegyptium</i>	89,66	H
	<i>Portulaca oleracea</i>	84,48	Th
	<i>Ageratum conyzoides</i>	68,97	Th
IV (60 to 80 %)	<i>Brachiaria lata</i>	67,24	Th
	<i>Digitaria horizontalis</i>	62,07	Th
	<i>Amaranthus spinosus</i>	58,62	Th
III (40 to 60 %)	<i>Mimosa pigra</i>	44,83	np
	<i>Euphorbia heterophylla</i>	27,59	Th

I (-20 %)	<i>Kyllinga erecta</i>	17,24	G
	<i>Spilanthes uliginosa</i>	17,24	Th

Th : Therophyte ; np : nanophanerophyte ; G : geophytes ; H : hemicryptophyte

Table 5: Distribution of Weeds by Relative Frequency and Average Dominance abundance.

Groups of self-propagating plants	Relative Frequency (fr)	Abundance dominance (A/D aver)
General major weeds	> 50 %	> 1,5
General potential weeds	> 50 %	1,25 < A/D aver. < 1,5
General weeds	> 50 %	< 1,25
Regional major weeds	20 % < fr < 50 %	> 1,5
Regional potential weeds	20 % < fr < 50 %	1,25 < A/D aver. < 1,5
Regional weeds	20 % < fr < 50 %	< 1,25
Local major weeds	< 20 %	> 1,5
Potential local weeds	< 20 %	1,25 < A/D aver. < 1,5
Minor weeds	< 20%	< 1,25

Table 6: Rate of use of different methods of self-propagating plants control.

Methods	Vegetable plots	(%)
Manual and chemical	3	37,5
Manual	4	50
chemical	1	12,5
Total	8	100

VII. Discussion

Floristic richness

The self-propagating flora of the vegetable plots of the city of Gagnoa consists of 14 species obtained from 58 surveys. The presence, distribution and abundance of these weeds may be due to tilling techniques and control methods used to control these species at each study site. This flora, relative to the areas of plots, could be explained by the land constraints faced by gardeners, thus obliging them to regularly exploit reduced surfaces thus causing a strong disturbance of the soil which favors the proliferation of self-propagating plants²⁴. With an annual rainfall of between 1400 and 2000 mm of rain according to¹³, the town of Gagnoa remains relatively humid all year round, which is also favorable for the germination of seeds of weeds buried in the ground. Ploughing or manual labor could also explain the proliferation of self-propagating plants by soil preparation work that would place seeds buried on the surface under better germination conditions. This flora is however less rich than that of several authors such as^{25,24,13,16}. Indeed, this flora has been inventoried in smaller areas than those of these authors. The percentage of Dicotyledons and Monocotyledons is the same, unlike those of several other authors who show a strong importance of Dicotyledons compared to monocotyledons. We can mention^{25,26,27,9} which mention a proportion of about 2/3 of Dicotyledons and 1/3 of Monocotyledons in their studies. The equal proportion of Dicots and Monocotyledons in this study is thought to be due to the low number of species inventoried in all study sites. The prevalence of Poaceae, Compositae and Cyperaceae in our study area is in line with the observations made by many authors^{28,29,30,31,32,12} who worked in tropical region on the flora of the harmful plants of the cultivated environments. These authors, in their various works, mention these families as containing the most dominant weeds.⁸ explains the phenomenon of dominance of families with many species by their adaptation to different environments. He also explains that the Compositae are largely anemochorous and can sow rapidly the cultivated environments as is the case in this study with a high density of *Ageratum conyzoides*. The fragmented floristic richness and the coefficient of similarity show that one meets almost the same species in the self-propagating flora of the vegetable plots of the city of Gagnoa. However, the JPC is the site that shelters all listed species. This could be explained by its proximity to a shallow. This offers a high variability of self-propagating plants due to the almost permanent presence of water and a high accumulation of nutrients²³. The high proportion of Therophytes may be due to the fact that all the study plots were open areas. This is favorable for heliophilous species, especially Therophytes. This dominance of Therophytes may also be due to the fact that these species are the first to be established from the first work of plot preparation in the agricultural practices of intertropical Africa in general¹². According to¹⁷, this high rate of therophytes indicates cultural habitats often disturbed by agronomic interventions. The repeated work of the soil tends to eliminate the perennial species in favor of the Therophytes³³. According to³³, the abundance of Therophytes can be explained by the high representativeness of seasonal immersion habitats, which are conducive to the development of annual plants with rapid germination and growth. This is also confirmed by the fact, established by³⁴ that if tilling perfectly destroys woody species (phanerophytes and chamephytes) or herbaceous species

(hemicryptophytes), it has a much more nuanced action on biological types adapted to disturbances such as perennials with high vegetative propagation capacity (geophytes) or especially annual plants (Therophytes). For the latter, the destructive action is largely compensated by the beneficial impact of the burial of seeds.

Infestation diagram

The relationship between average abundance and relative frequency gives an idea of the potential risk of aggression and harmfulness to the species³⁵.

The analysis of the relative frequency of the species highlights 5 classes of species, which show their potential for harmfulness and therefore their agronomic importance³⁶. The species *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Pennisetum polystachion*, *Phyllanthus amarus*, *Portulaca oleracea* and *Steinichisma laxum* with a frequency between 80 and 100% are the most harmful species at the scale of all sites.

If we set a threshold of 10% relative frequency, all species have a significant nuisance on all plots. This result is close to that obtained by¹⁷, which has been able to determine 70 harmful species vis-à-vis the winter cereals of the high Constantine plains.

The species *Ageratum conyzoides*, *Cyperus rotundus* and *Phyllanthus amarus* are the major general weeds. They are invasive and worrying for gardeners. The species *Ageratum conyzoides* in this list causes difficulties for farmers as noted³⁷. This author mentions that *Ageratum conyzoides* is a species which, punctually, is very abundant and causes enormous problems in agriculture. It also reveals that *Euphorbia heterophylla*, which is a regional weed in our study, is recognized for its very high germination capacity (more than 900 seedlings / m² up early in the season), its high growth rate (flowering 40 days after emergence) and its gradual emergence^{12,36}, when conditions are favorable.

Amaranthus spinosus, *Brachiaria lata*, *Digitaria horizontalis*, *Pennisetum polystachion*, *Portulaca oleracea* and *Steinichisma laxum* are general weeds. They also have significant infestation potential. Indeed, according to⁹ *Digitaria horizontalis* and *Ageratum conyzoides* deserve special attention because they represent the most harmful species to crops. These observations have also been made by several authors including^{38,39,40}. The identification of *Brachiaria lata* and *Portulaca oleracea* in this group confirms the observations of⁵ that the presence of these two species is favored by fertilization.

The general, potential regional and general groups constitute the core of the weed communities of the vegetable plots in this locality.

Kyllinga erecta and *Spilanthes uliginosa* are the group of species with moderate levels of infestation, also known as minor weeds. They do not generally represent an embarrassment for the culture but they occupy the cultivated space. It is therefore appropriate to eliminate them like all other species. But, self-propagating plants are known as species that evolve in time and space. Therefore, control strategies for these species must be adapted to each condition⁴¹.

The means of weed control differ from one garden to another depending on the means available to each gardener. The most used technique is the manual fight. These observations corroborate those of¹⁹. According to this author, agricultural work is a major contributor to the reduction of weeds in both annual and perennial crops. Indeed, from our investigations, it appears that most gardeners use manual control although it is relatively difficult and slow. Nevertheless, it is most practiced by gardeners who have little financial means to afford phytosanitary products. The vast majority of gardeners interviewed combine the two methods of struggle. These results are similar to those of⁴². For this author, chemical weeding complements manual control and also eliminates weeds; but the chemical fight can not in any case replace the manual struggle because it requires more financial means to the gardens.

VIII. Conclusion

The vegetable gardens in the town of Gagnoa are home to a diverse weed flora. The presence and / or abundance of weed species are characteristic of the working conditions of gardeners. Thus, the kitchen garden of the Gagnoa civil prison houses all the different types of weeds identified. In total, a list of 14 weed species divided into 14 genera and 8 families has been inventoried. This flora is characterized by the predominance of Poaceae (36%), Compositae (14%) and Cyperaceae (14%). *Ageratum conyzoides*, *Cyperus rotundus* and *Phyllanthus amarus* are the most common and abundant species. They represent the major general weeds in the kitchen gardens of the town of Gagnoa, giving them a very high degree of damage to crops. The species *Kyllinga erecta* and *Spilanthes uliginosa*, as minor weeds, represent less of a hazard to crops but are nevertheless a problem as they occupy space. The determination of the biological types, with a dominance of Therophytes (57,14%), made it possible to better characterize this flora and to identify the main problematic species.

This study, which is an opening door on the problem of the management and control of weeds in vegetable gardens, could be spread all over the national territory in order to inventory all the weed species in vegetable gardens and then set up an integrated pest management program that will be accessible to all. Apart from

products from vegetable gardens that are useful for consumption, vegetable gardens have ornamental and environmental protection functions.

References

- [1] Isingrini T. Université Paul Cézanne Aix-Marseille III – Institut d'urbanisme et d'Aménagement Régional -Mémoire de Master-FC 2009/2010 Urbanisme, Projet territorial et Développement durable. Jardins familiaux, du développement social au développement durable. 2010 ; 153 pages.
- [2] Potagers de France, Un réseau de jardins potagers et fruitiers de France, 2012. [Online] Available: <http://www.potagers-de-france.com> (October 15, 2015).
- [3] De Margerie S. Potager 2000, pré-étude en vue d'une nouvelle gestion du potager du Roi à Versailles ; mémoire de DESS, ENSP Versailles, Université Paris 1, Panthéon-Sorbonne.
- [4] Jardins potagers communautaires de N'Ganon et Nangoukaha, Côte d'Ivoire-Tours, dans le cadre du projet 4Cities4Dev, 2011. [Online] Available: <http://www.4cities4dev.eu/fra> (April 20, 2015).
- [5] Merlier H, Montégut J. Adventices tropicales. ORSTOM, CIRAD-GERDAT, ENSH, Montpellier, France. 1982 ; 490 pages.
- [6] Le Bourgeois T, Marnotte P. Session tropicale du COLUMA 2001. Les mauvaises herbes des cultures tropicales. Phytoma, la Défense des Végétaux. 2002, 551 : 8-12.
- [7] Di Castri F. On invading species and invaded ecosystems: the interplay of historical chance and biological necessity in Europe and Mediterranean basin. Kluwer Academic Publication, Dordrecht. 1990 : 3-16.
- [8] Maillet J. Constitution et dynamique des communautés des mauvaises herbes des vignes de France et des Rizières de Camargue. Thèse Doc. UNV. Montpellier II. 1992 ; 163p.
- [9] Mangara A, N'da AAA, Boraud NKM, Kobenan K, Lejoly J, Traore D. Les adventices en culture d'ananas : Ananas comosus. (L) Merr. (Bromeliaceae), dans les localités d'Anguédédou, de Bonoua et de N'douci, en basse Côte d'Ivoire : inventaire et essai de lutte. Thèse de Doctorat de l'Université de Cocody-Abidjan. Spécialité : Ecologie Végétale, Option. Malherbologie. 2008 ; 208 p.
- [10] Boraud NKM, AKE-ASSI E, N'Dja J, Aké S, GASQUEZ J. Impact agro écologique de simulation de culture transgénique de maïs résistant au glyphosate et effet répétitif d'un traitement herbicide sur la flore adventice en Cote d'ivoire. Sciences & Nature. 2010 ; 7 (1) : 41 - 49.
- [11] Ipou Ipou J, Adou LMD, Touré A, Marnotte P. Aspects de la dynamique d'enherbement des parcelles par Euphorbia heterophylla L. (Euphorbiaceae) : production de graine et évolution du stock de semences. 2011.
- [12] Ipou Ipou J. Biologie et écologie de Euphorbia heterophylla L. (Euphorbiaceae) en culture cotonnière, au Nord de la Côte d'Ivoire. Thèse de Doctorat de l'Université de Cocody-Abidjan. Spéc. Ecol. Végét., Opt. Malherbologie. 2005, 200 pages.
- [13] Gnahoua G.M. Contribution des légumineuses à la régénération des jachères : Intérêts et limites des arbres fixateurs d'azote en zone forestière de Côte d'Ivoire. Thèse de Docteur Ingénieur en Sciences Agronomiques. Université de Cocody-Abidjan, Côte d'Ivoire. 2004, 142 pages.
- [14] Boraud NKM. Etude floristique et phytoécologique des adventices des complexes sucriers de Ferké 1 et 2, de Borotou-Koro et de Zuénoula, en Côte d'Ivoire. Thèse de Doctorat 3e Cycle, UFR Biosciences, Université d'Abidjan-Cocody. 2000, 157 pages.
- [15] Ganglo JC. Phytosociologie de la végétation naturelle de sous bois, écologie et productivité des plantations de teck (Tectona grandis L.f.) du Sud et du centre Bénin. Résultats des travaux de recherches. Université Libre de Bruxelles, Laboratoire de Botanique Systématique et de Phytosociologie. 1999, 262 pages.
- [16] Le Bourgeois T. et Guillermin JL. Etendu de distribution et degré d'infestation des adventices dans la rotation cotonnière au nord-cameroun. Weed Reseach. 1995, 35 : 89 - 98.
- [17] Le Bourgeois T. Les mauvaises herbes dans la rotation cotonnière au Nord- Cameroun (Afrique) : Amplitude d'habitat - Degré d'infestation. Thèse de doctorat, université de Montpellier II Sciences et techniques du Languedoc. 1993, 249 pages.
- [18] Fenni M. Étude des mauvaises herbes céréales d'hiver des Hautes Plaines Constantinoises. Écologie, dynamique, phénologie et biologie des Bromes. Thèse Doc. Es Sci., UFA Sétif. 1993, 2003, 165pages.
- [19] Bayer. Important crops of the world and their weeds (Scientific and common names), Synonyms and W.S.S.A. /W.S.S.J. Approved computer codes. First edition, Bayer edition, Leverkusen, Federal Republic of Germany. 1992, 1682 pages.
- [20] Godron M. Quelques applications de la notion de fréquence en écologie végétale. Oecologica Plantarum 3: 185-212.
- [21] Sorensen T. A method of establishing group of equal amplitude in plants sociology based on similary of species content. Det Kongelige danske videnkarbernes. Biologiske Skrifter. 1968 ; 5 (4) : 1 - 34
- [22] Gounot M. Les méthodes d'étude quantitative de la végétation. Paris, Masson et Cie Eds. 1969, 314 pages.
- [23] Daget P, Poissonet J. Analyse phytologique des prairies. Applications agronomiques. Montpellier, CNRS, CEPE. 1969, 48 : 67 pages.
- [24] Kouamé AS. Flore adventice des cultures vivrières de la zone périurbaine du district d'abidjan (Côte d'Ivoire). 2017, 10 pages.
- [25] Mangara A. Les adventices en cultures d'ananas : Ananas comosus (L.) Merr. (Bromeliaceae), dans les localités d'Anguédédou, de Bonoua et de N'Douci, en basse Côte d'Ivoire : Inventaire et essai de lutte. Thèse de Doctorat de l'Université de Cocody – Abidjan. 2010, 207 pages.
- [26] Kouamé KF. Biologie et écologie des adventices majeures de la riziculture dans la région du béliér au centre de la Côte d'Ivoire. Thèse de l'Université Felix Houphouët Boigny. UFR Biosciences. 2014, 186pages.
- [27] Traoré K. Étude comparée de la flore adventice des agro-écosystèmes élaicoles (Elaeis guineensis Jacq.) en basse Côte d'Ivoire : Cas des localités de la Mé et de Dabou. Thèse de l'Université de Cocody, Abidjan, UFR Biosciences. 2007, 150pages.
- [28] Akobundu IO. Advances in weed control in conventional and no-tillage maize. Proceedings of the seventh conference of the weed Society of Nigeria. 1977, 10-20.
- [29] Terry PJ. Weeds and their control in Gambia.trop. Pest Manag. 1981, 27 : 44-52.
- [30] Hoffmann G. Caractérisation de la flore adventice de deux villages du terroir de Katiola (Côte d'Ivoire). Mémoire IAT ESAT-CNEARC- Montpellier. 1986, 51 pages.
- [31] Traoré H. Influence des techniques culturales sur le développement des mauvaises herbes en station et en milieu rural de Côte d'Ivoire. Mémoire de D.E.A., Biologie et Ecologie Végétales, USTL, Montpellier (France). 1987, 50pages.
- [32] Maillet J. Evolution de la flore adventice dans le Montpellierais sous la pression des techniques culturales. Thèse DDI, USTL, Montpellier. 1981, 200 pages.
- [33] Hammada S. Etudes sur la végétation des zones humides du Maroc: Catalogue et Analyse de la Biodiversité Floristique et Identification des principaux Groupements Végétaux. (Biologie). Faculté des Sci., Université Mohamed V, Agdal. 2007.
- [34] Jauzein P. Biodiversité des champs cultivés : l'enrichissement floristique. Dossier de l'environnement de l'INRA. 21, 22 pages.

- [35] Barralis G, Chadoeuf R. 1980. Etude de la dynamique d'une communauté adventice : Evolution de la flore adventice au cours du cycle végétatif d'une culture. *Weed Research*. 2001, 20 : 231 - 282.
- [36] Lebreton G, Le Bourgeois T. Analyse comparée de la flore en culture d'ananas et de canne à sucre à la Réunion. [http : //www.prvp.org/index.php/r/content/download/1586/12827file/Le%20rapport%20ananas.pdf](http://www.prvp.org/index.php/r/content/download/1586/12827file/Le%20rapport%20ananas.pdf) consulté le 19 avril 2017. 2005.
- [37] Touré A, Ipou Ipou J, Adou YCY, Boraud MKN, N'Guessan K. Diversité floristique et degré d'infestation par les mauvaises herbes des agroécosystèmes environnant la forêt classée de Sanaïbo, dans le centre-est de la Côte d'Ivoire. 2008.
- [38] Machane Y. Efficacité des herbicides les plus utilisés dans la culture du blé dur, de la région de Sétif. Thèse de magister. UFA Setif. 2008, 78 pages.
- [39] Deguine JP, Ferron P. Protection des cultures et développement durable : bilan et perspectives. I.N.R.A., CIRAD, Montpellier. 2004, 57-65.
- [40] Kadra N. Les mauvaises herbes en grandes cultures. *Mem.Ing.*, INA Alger. 1976, 59p.
- [41] Dessaint F, Chadoeuf R, Barralis G. Diversité des communautés de mauvaises herbes des cultures annuelles de côte d'Or (France). *Biotechnol*. 2001.
- [42] Fenni M. Contribution à l'étude des groupements messicoles des hautes plaines Setifiennes. Thèse de Mag., Ferhat Abbas, Sétif. 1991, 142 pages.

* Diomandé Souleymane1. " Weeds In The Vegetable Garden of The Town of Gagnoa (Côte d'Ivoire)." *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)* 11.4 (2018): 49-59.