Sub-Sahara African Academic Research Publications
December, 2020 Editions

JASD
Journal of African Sustainable Development
Vol.17, No.2, ISSN: 2115-4255

PROBLEMS ASSOCIATED WITH WEEDS IN AGRICULTURAL PRODUCTION A CASE STUDY OF SABON GARI LOCAL GOVERNMENT AREA KADUNA STATE NIGERIA

NUHU BARAKA TAHIR & HAUWA RABI'U MUSA
Department Of Biology F.C.E Zaria.

Abstract

The study, the Problems Associated with weeds in Agricultural production), a case study of Sabon Gari Local Government, Kaduna State. The study population consist both the educated and the non-educated farmers in Sabon Gari Local Government Area Kaduna State. The purpose of this research work wasto assess the different methods of weeds control in Shika dam farmland of Sabon Gari Local Government Area of Kaduna State Nigeria. The study uses descriptive research design method, this involves the use of questionnaire and interviews. The researcher adopted descriptive statistics as a stool used for data analysis, simple frequencies count and percentages were used to analyze the data. 50 questionnaires were administered and all were completed and returned. The result of this study shows that majority of the respondent agree that weeds constitute major treat to crop production in Sabon Gari L.G.E.A, also majority agree that weeds reduced the quality and quantity of farm product thereby competition with the normal plant and also serves as a reservoir of some disease pathogens. few are of the view and agree that no any control method is effective to eradicate weeds while many are of the view and agreed that biological method is the best in getting rid of a weed base on this results and many more some recommendation were made. Biological method of weeds control which uses predators, pest and pathogens in controlling weed should be encourage as it not eradicating the weeds only but the non-targeted organisms are not affected, Government should

provide loans and others farming materials to support the farmers, Public awareness should be given by expert on the effect on weeds on plants, Government should frequently organize a seminar/forum on farmers for the latest technological instruments to be effective in weed management .this will make a successful eradication of weeds and gives rise to effective and efficiency in weeds management practices.

Keywords: *Problems, Associated, Weeds, Agricultural, Production.*

Introduction

Weeds are plants that under certain conditions cause economic and social harm to the farmers. In the agro-ecological context, weeds are a product of the inter-specific selection brought about by humans since they began cropping, which affected the soil and the whole habitat. The process of selection is continuous and depends on the practices adopted by the farmer. The present use of chemical herbicides has caused important changes of weed flora in cropping areas, including those of prevailing species as well as biotypes of other species becoming resistant to the commonly used chemical herbicides (Olayinka, 2019).

Weeds are commonly defined as plants that are unwanted where they grow. This negative perception emerged with agriculture and relates to the damage they cause to crops. In addition to direct competition with crops (or parasitism), weeds cause indirect damage by harboring insect pests and crop pathogens. Direct losses caused by weeds vary from crop to crop and from one agro-ecological zone to the other for the same crop. The importance of weeds is widely acknowledged and mankind is still far from dealing with them effectively (Rehm & Espig, 2005).

The damage caused by weeds is seen in various ways and seriously affects various agricultural processes. Weeds cause problems due to:

a. Competition with crops for nutrients, water and light;
b. The release of root exudates and foliar leachates toxic to crops;

c. The creation of a favorable habitat for the proliferation of other pests (arthropods, mites, pathogens and others), serving as hosts for them;
d. Interference with the normal harvesting process and contamination of produce.

Statement of the Problem

Worldwide, 13% loss of agricultural production is attributed to weeds, in spite of the control measures taken by farmers. If no action were taken to protect crops from weeds, the losses would amount to 30% (Oerkeet al. 2007). Weeds cause 5% losses in agriculture in the most developed, 10% in the less developed and 25% in the least developed countries. Farmers in the industrialized countries spend more money on controlling weeds than they do on any other pest (Akobundu, 2009). Weed problems are also reflected in the costs of hiring labour to carry out land preparation and weeding (Doll et al., 2007). Weeding is time-consuming. According to Harsch (2004), out of the total labour input of African women in rice production, 40–60% is spent on weeding. According to Le Bourgeois & Marnotte (2002) about 60% of the time in farming is spent on the first clearing of the farm and on weeding, representing 140–190 man-days per ha. The detrimental effects of weeds in Africa are far exceeding the world average. It is estimated that in Africa yield losses range from 25% to total crop failure, depending on many factors among which weed pressure, availability of improved weed control technology, cost of weed control and level of weed management practiced by farmers (Akobundu, 1987; Van Rijn, 2000). The majority of farmers in Ghana identified weeding as the main constraint in their farming system, with a major effect on yields (Amanor, 1994). In Benin, investigations carried out in the different agro-ecological zones revealed that weeds are a serious constraint on crop production (Carsky et al., 1994; 2003; Gbèhounou, 1998; Chikoye et al., 1999; 2002; Ahanchédé, 2000; Gbèhounou & Adango, 2003). Spear grass (*Imperatacylindrica*) interference can cause crop yield losses as high as 80% in cassava and 50% in maize (Koch et al., 1990; Chikoye et al., 2001).

Striga caused total crop losses on over 15,000 ha and was present on about 20,000 ha of fallow land, parasitizing wild hosts (Favi, 1986). Only in newly opened land is weed infestation limited and one weeding is enough to get a good yield. Weed problems have been aggravated and have become particularly acute as a result of population pressure, of shortening or eliminating fallow periods, of scarcity of labor, and of the collapse of commodity prices, particularly of cotton. This listing makes clear that weed problems need to be understood in the context of both the biophysical (soil, crops) and the socio-economic and political environment. In Benin, weeding is one of the most difficult and stressful farm operations. The drudgery associated with weed control is due to hand weeding, which is the method used by the majority of farmers. Family labour is seriously stretched on large farms and has to be deployed continuously for weeding, as the first weeded plots are re-infested by the time the last plots are cleaned. Farmers have no rest and sometimes have to give priority to other farm (and non-farm) activities based on opportunity cost (P.V. Vissoh 2000, personal observation). It was important to carry out a diagnostic study involving all stakeholders concerned to get a closer view of the weed problems experienced by farmers and to identify constraints on weed management as well as potential solutions. The diagnostic study should also help to place the weed problem in the context of agricultural changes that may cause the emergence of new weeds.

Objective of the Study

The specific objective of the study is:

a. To determine common weeds found in agricultural farm in Sabon Gari L.G.A.

Research Questions

In view of the above objective, the following research questions were formulated to guide the researchers:

a. What are the common weeds found in agricultural farm in Sabon Gari L.G.A?

b. To what extent has weed constitute constraint on crop production in Sabon Gari L.G.A?
c. What are Problems of Weeds to Agriculture Production in Sabon Gari Local Government Area of Kaduna State?
d. Is there any weed management strategies and as well as prevailing solutions that can be used in resolving the problems of Weeds in Agriculture Production among farmers of Sabon Gari Local Government Area of Kaduna State?

Significant of the Study

It is hope that the result of this research will have extreme beneficial value to the groups. The farmers, agricultural sector and the government

The farmers; it is believe that the study will enable farmers to select best farming strategy to use thereby eradicating the treat caused by weed which will bring about increment in quality and quantity of their farm produce.

Agricultural sector; it will enable the booming and development of agricultural sectors which will enhance more productivity of food, leading to equivalent distribution of farming resources thereby diminishing inflation among stakeholders.

Government and curriculum planners; the study will further help the government and curriculum planners to pay more attention to the equipment, materials and facilities needed in farming and development of the agricultural sector which in turn lead to the development of the state economically.

Scope of the Study

The diagnostic study will be restricted and carried out in Shika dam farmland in Sabon Gari Local Government area Kaduna state Nigeria with the total land area of 1hecter approximately 10,000square meters. The study in particularly concern with the problem associated with weed in Agricultural production in the area. Relevant area of this topic includes the identification of common weed in the area, a review of different control

measure as well as articulation of possible measures to weep out weed through improved methods.

Research Methodology

In this chapter, we'll discuss the research design, area of study, population, sample of the population, sampling technique, instrument for data collection, validation of the questionnaire, administration of the instrument and method of data analysis.

Research Design

The researcher chose a survey research design because it best answer the questions and the purposes of the study. The survey research is the one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group. In other words, only a part of the population is studied, and findings from this are expected to be generalized to the entire population (Nworgu 2004). Similary, McBurney (2005:170) defines the survey assessing public opinion or individual characteristics by the use of questionnaire and sampling methods.

The researchers will design the questionnaire which will contains fifty (50) itemized question responses options, which will be designed to determine positive or negative feelings towards the various issues in the questionnaire.

Population of the Study

The target population for this research defines to include the educated farmers and the non-educated farmers in Sabon Gari Local Govt area Kaduna State Nigeria, while the accessible population are the farmers, and educated farmers in Sabon Gari Local Government Area Kaduna State, since these are the non and educated farmers within the researcher's reach.

In this study, the accessible population comprised all the educated and non-educated farmers farming at Shika Dam Farm Land Sabon Gari Local Govt Area Kaduna State Nigeria.

Sample and Sampling Procedures

Due to the fact that the researchers will not be enable to accommodate all categories of respondents in the area of study, a representative sample will adopt random sampling from the larger population to select respondents to give everybody equal chances of participating in the study.

To select from the population, the researchers will use simple random sampling. In other words, fifty (50) questionnaires will be administered. This is to say that, the researchers will made use of fifty (50) respondents from the target population. Therefore, this consists of the educated and non-educated farmers farming at Shika dam Sabon Gari Local Government Area of Kaduna state.

S/NO.	Category	Population
1.	Educated Farmers	20
2.	Non-Educated Farmers	30
	TOTAL	**50**

Instrumentation

In an educational research of this nature, one strategy of obtaining the required information is through the use of questionnaire. The instrument will help to gather data from many subjects within a short period of time (Bala, 2004). In addition to that, questionnaires will encourage confidentiality and easy way to computerize and kept for future use. In the light of the above, as a vital instrument questionnaire will be use as a research instrument in the study. The questionnaires will be structured into section "A" which was contained in a Bio-Data of the respondents, and Section "B" which consisted items intended to elicit responses from the respondents.

The researcher will develop items to which responses will be expected in various degree of "close ended questionnaire" to encourage the entire

participant to respond either negatively or positively to all the items of the instrument.

Validity/ Reliability of the Instrument

After the construction of the questionnaire a copy will be given to the project supervisor to assess, taking the correction made by the supervisor, the questionnaire will be reconstructed before tested for reliability.

To test for reliability, the copies will be distributed to farmers from the selected farmland especially farmers in Shika dam farm land in Sabon Gari Local Govt Area Zaria, by stratified random sampling. The data from each respondent will be collected and key information needed for the project will be obtained, the questionnaire will therefore considered reliable.

Procedure for Data Collection

The questionnaire will be administered to respondents with the selected farmland in Sabon Gari, Zaria. In the course of collecting data, the researcher will distribute questionnaires to the following. The educated and non-educated farmers and ask them to tick the appropriate responses to the given questions. Thereafter, the questionnaire will be returned to the researcher intact.

Data Analysis Procedure

Simple analysis descriptive will be used for data analysis. The responses that will be collected from the respondents will be used for the analysis using simple percentage. The main purpose for the use of percentage is to reduce the different set of numbers to a common based in order to facilitate statistical analysis and the interpretation of data.

The “simple percentage” derived from the frequencies of the respondents or responses will be used. In this regard, each item or the questionnaire will be treated with respect to the number of people that choose the option (items). The number of respondents in favor of each option divided by the total number of respondents multiplied by one hundred (100) gives the percentage (%). These percentages would be analyzed, presented and

interpreted respectively. In using simple percentage (%), the following formula would be used;

F = Stands for the number of respondents per item of the research question

N = Stands for the total number of all the respondents in the group, which would be multiplied by F score.

EX = represents the total number of the percentages of all the respondents.

Data Presentation and Analysis

General Information

Table 1 Parkinson, mesquite, blackberry, lantana and rubber vine are weeds commonly found in shika dam farmland

Variable	Frequency	Percentages %
Agreed	23	46
Strongly agreed	13	26
Disagreed	8	16
Strongly disagreed	6	12
Total	**50**	**100%**

Sources: filed survey, 2019

Table 1 showed that 23 respondents representing 46% agreed that Parkinson, mesquite, blackberry, lantana and rubber vine are weeds commonly found in shika dam farmland; 13 representing 26% strongly agreed with the statement, 8 representing 16% disagreed 6 representing 12% strongly disagreed with the statement. This showed that majority of the respondents agreed that Parkinson, mesquite, blackberry, lantana and rubber vine are weeds commonly found in shika dam farmland.

Table 2 The most occurred weeds in shika dam farmland include Parkinson, mesquite and blackberry.

Variable	Frequency	Percentages %
agreed	28	56

Strongly Agreed	9	18
Disagreed	10	20
Strongly disagreed	3	6
Total	**50**	**100%**

Sources: Field Survey, 2019

The table 2 Showed that 28 respondents representing 56% were agreed with the statement that, The most occurred weeds in shika dam farmland include Parkinson, mesquite and blackberry., 9 representing 18% strongly agreed, 10 representing 20% disagreed, 3 representing 6% strongly disagreed. This indicates the condition that most of the respondents agreed that. The most occurred weeds in shika dam farmland are Parkinson, mesquite and blackberry.

Table 3: Farmers income is reduced due to the presence on weeds.

Variable	Frequency	Percentages %
agreed	23	46
Strongly Agreed	21	42%
Disagreed	4	8%
Strongly disagreed	2	4
Total	**50**	**100%**

Sources: Field Survey, 2019

The table 3 showed, that 23 respondents representing 46% were agreed that Farmers income is reduced due to the presence of weeds, 21 representing 42% strongly agreed, 4 representing 8% disagreed, 2% representing 4% strongly disagreed with the statement. This revealed that majority of the respondents agreed with the statement which state that Farmers income is reduced due to the presence of weeds

Table 4 Weeds are widely spread over the farmland.

Variable	Frequency	Percentages %
agreed	19	38

Strongly Agreed	21	42
Disagreed	5	10
Strongly disagreed	5	10
Total	**50**	**100%**

Sources: Field Survey, 2019

The bale 4 Showed that 21 respondents representing 42% were strongly agreed that Weeds are widely spread over the farmland, 19 representing 38% agreed with the statement, 5 representing 10% disagreed and 5 representing 10% strongly disagreed with the statement. This indicated that respondents strongly agreed that Weeds are widely spread over the farmland.

Table 5 Weeds reduced the quality and quantity of farm products

Variable	Frequency	Percentages %
Agreed	16	32
Strongly agreed	20	40
Disagreed	11	22
Strongly disagreed	3	6
Total	**50**	**100%**

Sources: Field Survey, 2019

Table 5 Showed that 20 respondents representing 40% were strongly agreed with the statement, 16 representing 32% agreed that Weeds reduced the quality and quantity of farm products, 11 representing 22% disagreed and 3 representing 6% strongly disagreed with the statement. This indicated that majority of the respondents strongly agreed that Weeds reduced the quality and quantity of farm products.

Table 6: Weeds compete with the normal plant for nutrient, sun light and water.

Variable	Frequency	Percentages %
Agreed	17	34

Strongly agreed	25	50
Disagreed	4	8
Strongly disagreed	4	8
Total	**50**	**100%**

Sources: Field Survey, 2019

The table 6 showed that 25 respondents representing 50% were strongly agreed with the statement, 17 representing 34%, agreed, 4 representing 8% disagreed and 4 respondents representing 8% strongly disagreed. This indicated majority of the respondents strongly agreed that Weeds compete with the normal plant for nutrient, sun light and water..

Table 7: Chemical control method is usually used to kill weeds.

Variable	Frequency	Percentages %
Agreed	24	48
Strongly agreed	11	22
Disagreed	11	22
Strongly disagreed	4	8
Total	**50**	**100%**

Sources: Field Survey, 2019

The table 7 showed that 24 of the respondents agreed with the Statement, 11 respondents representing 22% strongly agreed, 11 respondents representing 22% were disagreed, and 4 representing 8% strongly disagreed with the statement. This indicated that most of the respondents agreed that Chemical control method is usually used in kill weeds.

Table 8: Biological control method is more safe and effective in killing weeds.

Variable	Frequency	Percentages %
Agreed	21	42
Strongly agreed	12	24
Disagreed	11	22

Strongly disagreed	6	12
Total	**50**	**100%**

Sources: Field Survey, 2019

Table 8 showed that 21 respondents representing 42% were agreed with the statement, 12 representing 24% strongly agreed, 11 representing 22% disagreed and 6 representing 12% strongly disagreed with the statement. This showed that most of the respondents were agreed that Biological control method is more safe and effective in killing weeds..

Table 9: To eradicate weeds Physical method should be used.

Variable	Frequency	Percentages %
Agreed	20	40
Strongly agreed	3	6
Disagreed	21	44
Strongly disagreed	5	10
Total	**50**	**100%**

Sources: Field Survey, 2019

The table 9 showed that 20 respondents representing 40% were agree ith the statement, 3 representing 6% were strongly agreed, 21 representing 44% disagreed and 5 representing 10% strongly disagreed with the statement. Therefore, this indicated that most of the respondent strongly disagreed that to eradicate all the weeds Physical method should be used.

Table 10: Thermal control method is not recommended in killing weed.

Variable	Frequency	Percentages %
Agreed	19	38
Strongly agreed	12	24
Disagreed	9	18
Strongly disagreed	10	20
Total	**50**	**100%**

Sources: Field Survey, 2019

Table 10 showed that 19 respondents representing 38% were agreed that Thermal control method is not recommended in killing weed. 12 representing 24% strongly agreed, and 9 representing 18% were disagreed, 10 representing 20% strongly disagreed with the statement.

This revealed that most of the respondents agreed that Thermal control method is not recommended in killing weed.

Summary of Findings

The research is to investigate on "Problems of Weeds to Agriculture Production in Sabon Gari Local Government Area of Kaduna State". Fifty respondents randomly selected and were used for this research. A structured questionnaire was designed by the researchers and data was collected back and analyzed successfully. The findings indicate that: majority of the respondents were male and were between the age ranged of 18-25 years. Also revealed that, majority of the respondents were single and majority of the respondents were literate i.e. educated respectively.

Based on the above information the finding showed that, majority of the respondents agreed that Parkinson, mesquite, blackber, lantana and rubber vine are weeds commonly found in shika dam farmland, majority of the respondents were strongly agreed that the most occurred weeds in shika dam farmland include Parkinson, mesquite and blackberry.., it is also revealed that most of the respondents agreed that lantana and rubber vine rarely occurred in shika dam farmland. and majority of the respondents agreed that weeds constitute major treat in crop production in Sabon Gari L.G.A

From the discussion, most of the respondents agreed that farmers income are reduced due to the presence of weed on their farmland. It also revealed respondent agreed that weeds are widely spread over shika dam farmland,. Majority of the respondents strongly agreed that weeds reduced the quality and quantity of farm products, respondents strongly agreed that weeds compete with the normal plant for nutrient, sun light and water e.t.c It can be deduced that majority agreed that weeds serves as reservoir of some diseases, it is revealed that, majority of the respondent agreed that Chemical control method is usually used to kill weeds on the farmland.

The finding further revealed that, majority of the respondents agreed that Biological control method is more safe and effective because its dose not affect the non-targeted organisms and is more cheaper alternative , the table revealed that majority of the respondent agreed that to eradicate all the weeds Physical method should be used i.e by plucking with hand scrapping them with hoe or machete e.t.c, it also state majority of the respondents agreed that thermal control method is not recommended in killing weed.

Finally the finding further revealed that, majority of the respondents agreed that Crop rotation has been the traditional practice to escape treat cause by weed in Sabon Gari L.G.A, the table also revealed that majority of the respondent strongly disagreed with the fact that none of the control methods biological, chemical or physical methods is effective in killing weeds.

Conclusion

Based on the major findings of the study, the following conclusions were made that using biological control method will be more efficient, effective and safe in eradicating weeds. From the results of the research it was observed that weeds has been a great limiting factor to farmers by reducing the quality and quantity of farm products. Based on these results, farmers have been using the traditional system of escaping treats cause by weeds.

Recommendations

In view of the major findings and conclusion, the research were makes the following recommendations which expected in eliminating, if not completely at least to a minimal level, Problems of Weeds to Agriculture Products.

i. Biological method of weeds control which uses predators, pest and pathogens in controlling weed should be encourage as it not eradicating the weeds only but the non-targeted organisms are not affected;
ii. Farmers should also collaborate with the Non-Governmental Organizations (NGO's) to donate modern farming technological instruments;
iii. Government should provide loans and others farming materials to support the farmers.

REFERENCES

Ahanchédé, A., (2000). Compétition entre les mauvaisesherbeset culture cotonnière: influence du Ahlonsou, E.D., 2002. Variabilité des régimes pluviométriques au Benin Période 1941–2000.

Akobundu, I.O., (2009). Weed Science in the Tropics: Principles and Practices. Wiley, Chichester, 522 pp.

ASCARD, J., HATCHER, P.E., MELANDER, B., UPADHYAYA, M.K.,(2007). Thermal weed control and Non-chemical weed management. Principles, concepts, and technology.CABI, London, UK.

BARBERI, P., (2002). Weed management in organic agriculture: are we addressing the right issues? Weed Research 42, 177-193.

BASTIAANS, L., PAOLINI, R., BAUMANN, D.T., (2008). Focus on ecological weed management: what is hindering adoption? Weed Research 48, 481-491.

BLACKSHAW, R.E., ANDERSON, R.L., LEMERLE, D., (2007). Cultural weed management. In: Upadhyaya, M.K., Blackshaw, R.E., non-chemical weed management: principles, concepts, and technology. CABI, London, UK.

BOND, W., GRUNDY, A.C., (2001).Non-chemical weed management in organic farming systems. Weed research 41, 383-405.

BRAVIN, F., ZANIN, G., PRESTON, C., (2001). Diclofop-methyl resistance in populations of lolium spp. from central Italy. Weed Research 41, 49-58.

CAAMAL-MALDONATO, J.A., JIMENEZ-OSORNIO, J.J., TORRES-BORRAGAR, A., ANAYA, A.L., (2001).The use of allelopathic legume cover and mulch species for weed control in cropping systems.cadre de la collaboration institutionnelle au Bénin. In: T. Bierschenk, P.-Y. Le Meur& M. Von.

Carsky, R.J., C. Acakpo, B.B. Singh & J. Detongnon,(2003). Cowpea yield grain from resistance to Strigesand.Chemical weed control in irrigated sweet pepper (*Capsicum annum L.*). Tropical Pest Management 37, 155-158.

DERKSEN, D.A., ANDERSON, R.L., BLACKSHAW, R.E., MAXWELL, B., (2002). Weed dynamics and Developing African Agriculture: New Initiatives for Institutional Cooperation. Proceedings of a development in various cropping systems.Weed Science 56, 155-160.development.Earthscan Publications Ldt, London.

Gbèhounou, G. & E. Adango, (2003). Trap crops of Strigahermonthica: in vitro identification and effectiveness in situ. Crop Protection 22: 395–404.

GIBBONS, D.W., BOHAN, D.A., ROTHERY, P., (2006). Weed Science – Principles and Practices, 4th edMontpellier II. Sciences et Techniques du Languedoc, 249 pp.

HARTWIG, N.L., AMMON, H.U., (2002). Cover crops and living mulches. Weed Science 50, 688-699.

HATCHER, P., MELANDER, B., (2003).Using plant population biology in weed research: a strategy to improve weed Management. North central US. Weed Science 44, 309-313.

HAWES, C., HAUGHTON, A.J., BOHAN, D.A., SQUIRE, G.R., 2009.

HERAP, I., (20000.Resistance to common ground sel to simazine and atrazine. Weed Science 18, 614-632.

KURSTJENS, D.A.G., PERDOK, U.D., (2000). The selective soil covering mechanism of weed harrows L.) against weeds. Weed Biology Management 7, 232-236.

Le Bourgeois, T. & P. Marnotte, (2002). La luttecontre les mauvaisesherbes. In: Memento de Le Bourgeois, T., 1993. Les mauvaisesherbesdans la rotation cotonnière au Nord-Cameroun (Afrique)..

LIEBMAN, M., DAVIS, A.S.,(2000). Integration of soil, crop and weed management in low-externalinput farming systems. Weed Research 40, 27-47

LUKEN, J.O., THIERET, J.W., (2005). Amur honeysuckle, its fall from grace.Bioscence 46, 18-24.

MANNING, R., (2004). Against the grain: how agriculture has hijacked civilization. North Point Press, Matter Dynamics and Sustainability of Tropical Agriculture. Wiley, Chichester, pp. 89–99.

MATTHEWS, J.M., (2014). Management of herbicide resistant populations. In: herbicide resistance in modified by a wheat crop: effects on weed seed germination. Journal of Applied Ecology 43,

MONACO, T.J., WELLER, S.C., ASHTON, F.M., (2002). Weed Science – Principles and Practices, 4th edMontpellier II. Sciences et Techniques du Languedoc, 249 pp.

MOOLANI, M.K., SACHAN, P.L., (2001). Studies on crop weed competition – A Review. *Journal of Moris, J. & J. Copestake(1993*).Qualitative Enquiry for Rural Development, a Review. Intermediate Technology Publications, London, 117 p

MOSS, S.R., (2008). Weed Research: is it delivering what it should? Weed Research 48, 389-393.

NAVAS, M.L., (2015). Using plant population biology in weed research: a strategy to improve weed Management. North central US. Weed Science 44, 309-313.

NAYLOR, R.E.L.,(2002). Weed management handbook. 9th eds. British Crop Protection Enterprise, Nederlof, E.S. & C. Dangbégnon (in preparation). Collaborative Action Research for Resource Poor. New York.

Oerke, H.W. Dehne, F. Schönbeck&A.Weber (Eds)(20070, Crop Production and Crop Protection; Estimated Losses in Major Food and Cash Crops. Elsevier, Amsterdam, pp. 742–770.

OLAYINKA (2019),.The potential of Siam weed (*Chromolaenaodorata*) as a source of observations on relative leaf area of the weeds. Weed Research 31, 97-105.

PAOLINI, R.,FAUSTINI, F., SACCARDO, F, CRINÒ, P., (2006). Competitive interactions between chickpea genotypes and weeds. Weed Res. 46, 335-344.

PERUZZI, A., SARTORI, L., (2005). Guide to the choice and the proper use of tillage operative Pest Management 45: 305–311.

POPAY, I., HOSKINS, G., LEWTHWAITE, R., (2012). Weed control in urban environements in Newpopulation of Digitariasanguinalis. Pesticide Biochemistry Physiology71, 190-195.

QASEM, J.R., (2005). Nutrient accumulation by weeds and their associated vegetable crops.*Journal radish (Raphanusraphanistrum)* populations across the western Australian.

RAO, V.S., (2000). Principles of Weed Science, 2nd Edn, Science Publishers, Enfield, New Hampshire, RASK, A.M., KRISTOFFERSEN, P., 2007.A review of non-chemical weed control on hard surfaces.

RASMUSSEN, J., (2008). Mechanical weed management. In: Proceedings second International Weed. Raton, Florida, USA.

Rehm, S. & G. Espig, 92005). The Cultivated Plants of the Tropics and Subtropics: Cultivation, Economic reproduction of *Cyperusesculentus* by specific crops. Weed Research 31, 153-160.

RYAN, G.F., (2001). Resistance to common ground sel to simazine and atrazine. Weed Science 18, 614-632.

SARRANTONIO, M., GALLANDT, E., (2003).The role of cover crops in North American cropping Science 56, 161-167.Science Society of America Abstracts 33, 115.Scientific, Oxford.

SHRESTHA, A., CLEMENTS, D.R., UPADHYAYA, M.K., (2004). Weed management in agro ecosystem . London 273, 1921-1928.

SONNEVELD, C., (2017). Changes in chemical properties of soil caused by steam sterilization. In: sorghum. Weed Technology 21, 511-517.

SWEET, R.D., YIP, C.P., SIEZKA, J.B., (2008). Can crop control weeds. Info letter Oregon State system for integrated plant protection in pepper (Capsicum annum L.). Expert Syst. Appl. 36, systems. *Journal of Crop Production 8, 53-74*.

TEASDALE, J.R., (2005). Contribution of cover crops to weed management in sustainable agricultural Technology 15, 199-203.

TEASDALE, J.R., MOHLER, C.L., (2000). The quantitative relationship between weed emergence and the Tilman, D., (eds.) Perspectives on plant competition. Academic Press, New York.Toulouse, Toulouse, 183 pp.

UPADHYAYA, M.K., BLACKSHAW, R.E., (2007). Non-chemical weed management: synopsis, integration, Value, Utilization. Technical Centre for Agricultural and Rural Cooperation (CTA), Ede, 552 pp.

Van Rijn, (2000) Participative farmer testing of four low external input technologies, to address soil fertility decline in Mono Province (Benin). Agricultural Systems 42: 265–276.

VILA-AIUB, M.M., MARTINEZ-GHERSA, M.A., GHERSA, C.M., (2003). Evolution of herbicide resistance in weed:crop competition model. Weed Research*Journal of Life Sciences 52: 285–303.*

WAUCHOPE, R.D., SUMNER, H.R., DAWLER, C.C., (2017). A measurement of the total mass of sprayweeds interactions in wheat with ALMANAC. Weed Research 37, 325-341.

WEBER, E., GUT, O., (2005). A survey of weeds that are increasingly spreading in Europe. Agronomy weed management strategies. Field Crop Research 67, 95-104.

WHALSH, M.J., DUANE, R.D., POWELS, S.B., (2001) New technologies and approaches for weed management in sustainable yield. Weed Science 37, 720-725.

WHISH, J.P.M., SINDEL, B.M., JESSOP, R.S., FELTON, W.L., (2002). The effect of row spacing and Wiley and Sons, Chi Chester, UK.with public work. Weed Science 50, 547-554.

ZIMDAHL., R.L., (2007).Time scales as a factor in decision-making by French farmers on weed management in annual crops. Agric. Syst. 93, 115-142.