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Interactive effects of growth retardants in the production of cowpea (Vigna unguiculata) in Niger biological

Abstract

This food competition between man and insects as race against up each part in a context where the first makes the feat on the last. strategies are to retard the growth of cowpea by performing removal interactive effects Raw old leaves, flowers, young pods and green pods between 20-40% respectively at the stage of branching, flowering and post-flowering. Thus the experimental device is a split-split plot with 4 factors not the same order of importance in terms of food. The setting up of absolute witness is biased because migration of the insect complex, uncontrolled variation source and makes it difficult to analyze the results.[1,2]

After twenty observations conducted on this test, the entomological challenge knows a partial solution with technologies for saving 0% infestation of major pests observed in 93% of the plots and the population of these insects was kept below the threshold severity in other plots on which few unmated individuals were observed and killed.

a. A recontamination of the plots was observed following trivial movements of bugs from neighboring plots andgrass near the field.

b. The removal of all leaves at the stage of advanced lifting modifies the port built in dense and attracts jassids.

c. removal of all flower buds and flowers change the short cycle in an intermediate cycle.

d. Better production of the leaf biomass was obtained on the plot (36) for having a fertility gradient.

Removing young or old leaves at the stage of branching and early harvesting of young pod stage post flowering gives the best yield potential of 3458 ± 9 and 3482 ± 9kg/ha obtained on plots 34 and 35 belong to a group. This technology produces 2.5 times more than 3 pesticide treatments.Stunting is a good strategy for the production of biological cowpea because it allows to deprive the larvae and adults of all food along its life thus leading to a breach of insect breeding cycle corresponding phenological stage.

Keywords: shift, deprivation, larva, preventive and biological

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Moussa Maazou,[1] Moussa Maazou,[2] Ibrahim Baoua,[2] Issoufou Hassane[2]

[1]National Institute for Agricultural Research of Niger (INRAN), Niger

[2]University Dan Dan Dicko Koulodo Maradi (UDDD/Maradi), Niger

Correspondence: Moussa Maazou, Faculty of Agriculture and Environmental Sciences, University Dan Dan Dicko koulodode Maradi, Department Productions Plant Science and Technology, Niger, Email mmaazou6@gmail.com

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Introduction

Cowpea [Vigna unguiculata (L.) Walp.] Is one of the world's major food legumes.[3] Of the nearly 4 million tons of cowpeas produced annually in the world, West Africa produces 70% of this production andNiger is one of the major cowpea producers in the subregion becauseeach year more than 5 million hectares are sown with a production of 1.5 million tonnes.The national average production over the period 2010-2014 are at 1,609,581 tons. Maradi and Tahoua displayed the highest production before Dosso and Zinder are at equivalent levels of production. Nigeria is its main market, which absorbs almost all exports. In terms of contribution to GDP, cowpea is the second largest export crop after onions.[i]

The cowpea is a food importance culture by its protein content 3 to 4 times higher than that of millet or sorghum. It is a culture to promote because of its economic and social importance.[4] It is a staple popular for its leaves, green pods and dry seeds, which can be consumed and marketed.[5] In Niger, cowpea occupies a prominent place in the diet of rural populations.[6] This performance is low for on-farm because it is attacked along vegetative and reproductive cycle mainly by a complex ofinsect pests of field that induce yield loss of up to 30-100% in the absence of an effective fight (Singh & Allen, 1979). Insect pests of field are the major constraint to cowpea production in West Africa because average yields of around 230kg/ha without application of pesticides against 800kg/ha application of insecticides. This difference is mainly due to a massive attack of the plant by the complex of the insects throughout the growing season.[7,8] Depending on phenological stage cowpea, these insects fall into insects: pre-bloom, bloom and post-bloom.[7–12][ii]

Environment and development issues

The Rio Conventions de Janeiro in 1992,[iii] Stockholm 2004[iv] and Rotterdam in 2006[v] have been ratified by at least 73 member countries of the UN, including Niger. The search for alternatives to pesticides

[i]Agricultural Productivity Program in West Africa (WAAPP). The cowpea sector in Niger / Areas for improvement proposed in the diagnostic study on trade integration (DTIS). December 2008. Article published by the Chamber of Agriculture of the Network website:http://www.reca-niger.org/spip.php?article281. Steering the data of agricultural statistics published by the website of the National Institute of Statistics:http://www.statniger.org/statistique/file/Annuaires_Statistiques/2013/AS_Chapitre/AS2010-2014_AGRICULTURE.pdf

[ii]http://m.elewa.org/Journals/wp-content/uploads/2016/12/2.Kpatinvoh.pdf

[iii]https://www.diplomatie.gouv.fr/sites/odyssee-developpement sustainable / files / 9 / Declaration_de_Rio_1992_fr.pdf, https://www.cbd.int/doc/legal/cbd-fr.pdf

[iv]http://www.wipo.int/edocs/trtdocs/fr/unep-pop/trt_unep_pop_2.pdf,https://www.google.com/search?q=Convention+de+Stockholm&ie=utf-8&oe=utf-8&client=firefox-b, http://cms.unige.ch/isdd/IMG/pdf/POP.pdf

[v]http://pfbc-cbfp.org/tl_files/archive/conventions/convention_rotterdam.pdf

has become essential because:

a. 73% of these dangerous products are pesticides. - pesticides kill insects and men over 20 people die every hour as a result of contamination from pesticides.

b. Pesticide poisoning many animal species and pollute the environment. - South countries are the most affected because some toxic for humans and the environment are still sold there.

c. about 25 million tons of pesticides worth $35 billion used annually worldwide, only 0.3% would reach their target. The rest is found in air, soil and water.

d. breathe in an environment polluted by pesticides can be fatal; the peasants who work every day on crops using these pesticides are exposed to increased risks of cancer, neurological diseases,leukemias, brain tumors reproductive disorders, dysfunction of endocrine hormones, and defects in children(AVSF,[13] Dewailly, et al.,[14] Greenlee, et al.,[15] Menegaux, et al.[16]

e. Epidemiological studies in families of farmers have showned that the majority of men exposed to pesticides had a sperm concentration well below the normal limit considered fertile men (Oliva 2001; Velez. 2001). Neurological disorders resulting in neurodegenerative diseases such as Parkinson's, Alzheimer's, leukemia and brain tumors are attributed to exposure to pesticides.[17]

f. Once emitted into the atmosphere, pesticides are dispersed by the wind and then settle to the ground; because of their persistence, they can be transmitted from the ground to the atmosphere by a process commonly called "grasshopper jump effect".[18]

g. Pesticides are toxic and harmful products to health, and can be accumulated in the environment and in the food chain for 40 years (and capinov PHYTOCONTROL).[19,20]

Although the state does not have enough money, large amounts of pesticides were used in Niger cowpea to reduce the extent of damage caused by: aphid (Aphis craccivora, koch), the hairy caterpillar (Amsacta moloneyi DRC.), whitefly (Bemisia tabacci, Genn), the cotton bollworm (Helicoverpa armegera, Hübner, 1808), the worm cotton, (Spodoptera littoralis Boisduval), flower thrips (Megalurothrips sjostedti (Trybom)), the auger borer (Maruca vitrata Fabricius), black bug (Anoplocnemis curvipes Fabricius), brown bug (Clavigralla tomenthosicollis, Stal) and mylabre (Mylabris biparta, voigt).

Scientific issues

Biological cowpea production strategies based on a statement and three main hypotheses from observations on the conditions of cowpea production in Niger.

The main finding

In Niger, it was found that low rainfall areas near the northern boundary of cultures occur without phytosanitary treatment more cowpea that the southern band due differentiated climatic conditions that enable the development of culture but also a great diversity parasites. This justifies a lesser insect outbreaks in the north where the severity of the attacks on cowpea is low and does not require phytosanitary treatment compared to the south, wetter. In the southern strip, the various technical services, projects and NGOs recommend the cowpea producers phytosanitary treatment in the fight against pests of field that induce significant losses in production.

We must mention certain eating habits that allow the use of certain ground parts of plants such as welding power such as leaves and twigs, young garlic and green pods.

The hypotheses

Hypothesis 1: The one admits that a resulting damage when the arrival of an insect category coincides with a host phenological stage providing the most food consumed by it.

Hypothesis 2: We can avoid the damage caused by insects avoiding the coincidence of the phenological stage of the host and parasite emergence of that which will thus be deprived of the food that is supposed to find, by a shift from the date of sowing for example. But sowing shift in the southern strip is a risk that farmers can take, given the randomness of the rainy seasons.

Hypothesis 3: This offset can be done differently on different phenological stages of cowpea by making use of agronomic strategies such as removing outer leaves and branches, removal of flower buds and flowers and young pods of early crops and green pods. These operations are intended to retard the growth of the plant and coincide with the hatching insects concerned the period before flowering respectively, flowering and post flowering. So every insect category is a shift method of phenological stage of cowpea, in order to deprive the larvae and adults of all food, which leads to reproductive cycle of interruption, where eradication effective bio-aggressor infesting cowpea crop land to corresponding phenological stage.

Methods

This food competition between man and these insects as race against up each part in a context where the first makes the feat on the last.

Removal of old leaves

This practice involves removing the first old leaves and twigs which feed on insects prebloom while maintaining the roots and terminal buds to allow regrowth.

It is used to fight directly against insects prebloom such as aphids, hairy caterpillar, worm cotton, the cotton bollworm, ootheca mutabilis, whitefly.

Removal of the first flowers

The practice is to remove the first flowers which feed on insects bloom while avoiding damage cowpea. It is used to fight directly against flower thrips, borers drill pods and mylabres.

La early harvest of young pods or green pods

This is a manual operation that involves harvesting the young pods or green pods that feed on insects post flowering while avoiding damage to the plant. It is used to fight directly againstborer drill pods Flower thripsThe mylabres brown and black bugs.\

Experimental design

The experimental design was a split-split plot with 3 main blocks spaced by a row of 5m. Thus, each block has 27 fields spaced from each other by an alley 1.5m; a total of 81 plots. 3 repetitions of 9.6 m2

each are installed in each plot. They are separated by a 40cm driveway. The bug count is done with the naked eye on a sample of 10 bunches, 10 flowers, 10 young pods and cloves in 10 central rehearsals. The number of insects observed is noted then are mechanically killed. 4 observations sequences are: 1 day before application, 7 days, 14 days and 28 days after the application of each strategy.

NB: Each technique is performed 20-40% of the corresponding stage. The yield (kg / ha) of a repeat is thus obtained by the following formula:

$$RAH(Rendement\ A\ l'Hectare) = \frac{10RTR}{0.16\times 9.6}\ \text{Or,}$$

$$RTR(Rendement\ Total\ de\ la\ Répétition)_n = \sum_{n}^{i=1} R_i$$

n equals the number of harvesting (here n = 3).

So the formula for total return is found by adding 3 reps made the plot.

It is given as follows:

$$RTP(\text{Rendement}\ Total\ of\ the\ Parcel) = \frac{TRT_1 + RTR_2 + RTR_3}{3}$$

Data were entered using the Excel software and data analysis was performed using the EViews software 8.msi

Results and Discussion

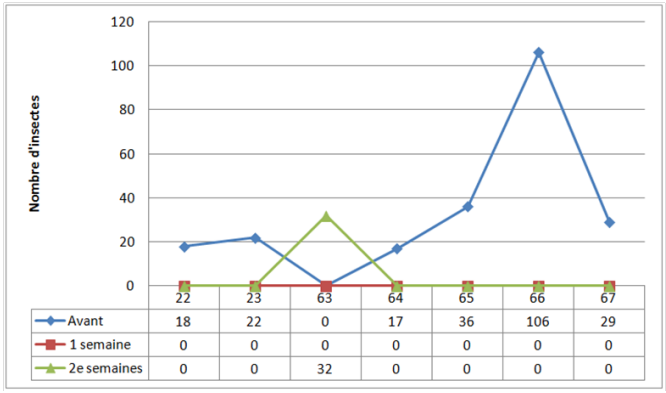
The 63 plots on which the leaves and buds were removed have been systematically excluded from the analysis because 54 of them were recorded 0% insect-bloom and the upright variety of cowpea was modifieded in an intermediate port 9 on the other. Thus, only the encrypted resultseds 18 plots on which 347 floriculture insects were observed are shown in the data tables and in the following figures. Figure 1 & Figure 2 shows that 6 plots were infested with thrips before the removal of the first flowers. These 6 plots are divided as follows:

a. 22 and 18 thrips a population density of 0, and 0.6 per flower thrips were observed respectively on plots 22 and 23 on which young and old leaves have been previously removed. The observed grain yield ranges from 1632kg/ha to 2332kg/ha, respectively, for the parcel 22 and the land 23. At the value of15.16379 F = 4, 13, the performance difference is highly significant between these two plots.

b. This density is increasing from 0.56 to 3.53 individuals per flower respectively on plots 64 and 66 and then falling to 0.96 individuals per flower was observed on plot 67 for all young and old leaves were removed. the delay of one week removal flowers caused the appearance of 1,2 and 3, 53 per flower thrips respectively in plots 65 and 66.

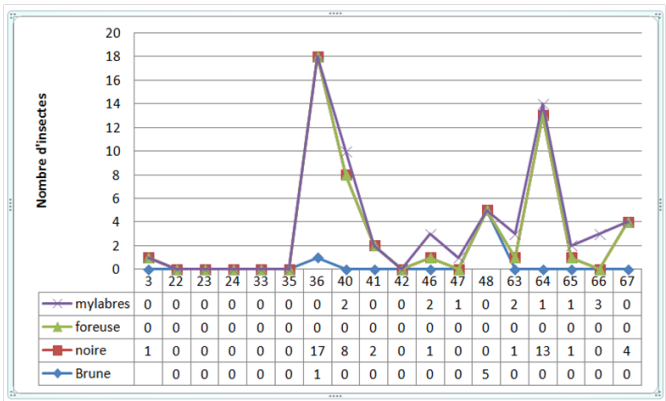
Thus the interactive effect of the removal of flowers and old leaves turned out as a very effective strategy for fighting alternative to pesticides against thrips because the reproductive cycle has been interrupted; why the pest was not observed the following weeks. This resulted in a yield increase; a very significant difference from the group of (2000-2500)kg/ha belong the plots 64, 65 and 67. It was observed a density of 1.06 thrips per flower on plot 63A 2nd week after the removal of flower buds and thrips 0% in the same period of the 6 other plots. This implies that the thrips at least regenerations and removing interactive effect could interrupt the cycle of the first generation of thrips on the other 6. By performing similar work Zakari et al.,[11] have made two-three chemical treatments in the fight against the pest densities ranging from 3 to 15, 4 per flower thrips respectively for the first and second treatment and obtained a yield varying depending on the variety of (1453 -2258)kg/ha in integrated management.

Despite the density 3, 53 thrips per flower, returned [2500, 3000) kg/ hawas obtained on plot 66. Cowpea reacted very favorably to the stress induced by the interactive effect of the early harvest of young green pods and cloves in the flowering stage post because the gap between these two crops is 17 days. Therefore this strategy produces 2 times more efficient than the use of phytosanitary products. 84 -floraison post insects were counted 4th week after the early harvest against 263 insects flowering or 24.20% of flower-eating insects. Before the early harvest of young garlic and green pods, thrips were observed on plots 34 and 36 with a respective density of 0.3 and 0.03333 per flower on which young and all leaves were removed the August 12. Young pods were harvested on September 8 is a lag of 27 days against 17 days of offset for plots 64,65, 66 and 67. This difference of 10 days has caused the appearance of the second generation of the thrips density 1.066 per flower as in interactive effect caused the removal of flower buds dated 23 August and harvesting of all pods in September 14 on 63. the length of the gap between these 2 treatment is 22 days.



	22	23	63	64	65	66	67
Avant	18	22	0	17	36	106	29
1 semaine	0	0	0	0	0	0	0
2e semaines	0	0	32	0	0	0	0

Figure 1 Evolution of Megalurothrips sjostedti in infested plots.



	3	22	23	24	33	35	36	40	41	42	46	47	48	63	64	65	66	67
mylabres	0	0	0	0	0	0	0	2	0	0	2	1	0	2	1	1	3	0
foreuse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
noire	1	0	0	0	0	0	17	8	2	0	1	0	0	1	13	1	0	4
Brune		0	0	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0

Figure 2 Post-bloom insects observed in the fourth week after early harvest.

Thus the value of 5.060541 and F=(4, 85) the variation of the density of thrips 0.03, 0.3 and 1.066 per flower thrips on these plots despite it is significant also resulted in a very significant difference in term performance of grain 3458 respectively, 1894 and 2074 Kg/ ha. So all these plots belong to groups significantly different as these

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three densities are dehere the severity of mourning. One of the plot 36 is lower than the other two because it was infested with brown bug a week before the harvest of young pods. This presupposes a long shift of 20 days can bring up the bugs in a densityedof young 0.06666 per pod. Hence, the plot is classified in group producing plots [1500, 2000) kg/ha which plots 22 and 41 and y 63 belong. Of all the stress, the stress produced by the removal of young and old leaves at the branching and early harvesting of young pod stage post flowering gives the best yield potential of 3458 and 3482 kg/ha respectively obtained on plots 34 and 35 belonging to the same group serving as a demonstration unit. The abduction of young, old and all leaves at the branch respectively of 46, 47 and 48 did not brakeed the appearance of a complex insect on them and on the plot 3. 4 parcels belong to the plots of the group producing a yield of [1000, 1500) kg/ha are included plots 42 and 40 on which two moths drills pod were observed. A gap of 23 days between removal of old leaves and the early harvest of young pods was so long that it causes the appearance of the drill borer in the first fortnight of September. The emergence of Maruca vitrata is justified because according ADETI et al.[21] Larval development cycle is Completeded in 20 days at the temperature of 300c. Also according Baoua et al., in 2013 when a total rainfall of 554.7 mm was recorded in 42 days, the presence of this serious pest of cowpea is found toths the 7th week after sowing then proliferates in the period August - October. This assumes that the pest makes at least two generations during the rainy season in September with a generation precisely.according to Roy Neilson et al.[22] The number of M.vitrata is approximately 5 times higher in the flowers on the pods and the presence of a larva into a flower or pod is considered economically important threshold. According Jakai & Singh SR.[23] Baoua et al.,[4] and Zakari et al.,[11] 2013, two to three chemical treatments are needed depending on the degree of infestation because M.vitrata (syn. M.testulalis) causes losses when the economic density 0,4-0,6.Ainsi flower is the interactive effect of the old leaves and the early harvest of young pods produces the same effect as the use of pesticides because it produces the same yields 1452 ± 4.079216Kg/ha.

The plot 42 being free from any attack can be included in R & D because the stress induced by the interactive effect of removing all the leaves at the stage of branching and early harvest green pods has the same effect on performance that the removal of all leaves at the stage of advanced liftingede making plot 3 bushy and attractive jassids. He was findinged Figure 3 that the parcel 36 has experienced the arrival of a complex of 10 brown bugs, 38 black bugs and thrips 2 for the period of the lag between the removal of all leaves and young pods early harvest is long of 27 days. The first generations that have not been observed, this land belongs to the 4 plots group that returned [1500, 2000) kg / ha significantly very different yields of 4 other groups.I is 22,41et 63 plots which all the pods were harvested early September 14 3 weeks after the removal of flower buds. according to Nebi,[9] The peak of this insect complex is between 64-70 days after sowing. In 2009 IYDugje et al.[10] Have made the same observation. They recommended that the West African producers to make 2 to3 phytosanitary treatments and had a return from 1400 to 2000 kg / ha. Thus, the interactive effect of these two agronomic strategies applied to these 4 plots produced a gain of 100kg/ha recommended that the 3 phytosanitary treatments. A lag time between 21-27 days because an insect outbreak on the plot. However the yields on these three plots is much higher than those obtained using pesticides except the interactive effect of removing old leaves and young pods of early harvest that produces the same effect.

Table 1 The potential yield 3482 ± 9kg/Ha was obtained on plot 35.

Order of importance	plots	strategies applied	obtained yield
1	35	Remove old leaves and harvest the young pods	3482 ± 9 a
2	34	Remove the young leaves and young pods harvest	3458 ± 9 a
3	66	Remove the first flowers and young pods and collect the green pods	2855b
4	65	Remove the first flowers and harvest the green pods	2454 ± 13.56138c
5	67	Remove any flower buds and flowers and harvest the young pods	2434 ± 13.56138c
6	23	Removing the leaves and the first flowers	2333 ± 13.56138c
7	64	Remove the first flowers and harvest and harvest the green pods	2228 ± 13.56138c

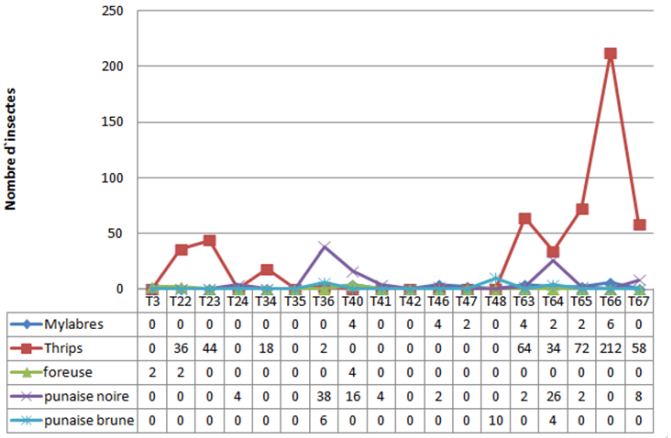

Figure 3 Number of insects observed on all plots.

Conclusion

It appears from this study that the yields of these 18 plots are divided into 5 groups. A value15.16379, F=(4, 13), P=0.0001, performance test between the 5 groups resulted in a highly significant difference. Thus the interactive effect of the removal of flowers and old leaves turned out as a very effective strategy for fighting alternative to pesticides against thrips because the reproductive cycle has been interrupted; why the parasite was not observed the following weeks. This resulted in a yield increase; a very significant difference from the group of (2000-2500) kg / ha belong the plots 64, 65, 67 and 23 may be registered RD. It provides a gain of 500- 1000kg/ha compared to phytosanitary treatments. Despite the density 3, 53 thrips per flower and from 218 insects, returned [2500, 3000) kg/hawas obtained onhas 66 plot because the offset 17 days between removal of the first flowers and the early crops of young green pods and resulted in a highly significant increase in terms of performance. This technology produces 1.75 times more than 3 pesticide treatments. Of all the stress, the stress produced by removing young or old leaves at the stage of branching and early harvesting of young pod stage post flowering gives the best yield potential of 3458 and 3482 kg/ha obtained on

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the plots 34 and 35 belonging to the same group. This technology produces 2.5 times more than 3 pesticide treatments.

Also, removal of all leaves at the stage of lifting and branching, early harvest of green pods post flowering stage and the damage caused by an insect complex has the 4th week after the early harvest produced one effect on yield. Also, a Mylabre 0.16666 per pod density statistically produce a similar effect and gives a yield below 2075 ± 12.35722kg/ha. A lag time between 21-27 days because an insect outbreak on the plots. However the yields on these four parcels is significantly higher than those obtained using pesticides. Thus the interactive effect of the old leaves and the early harvest of young pods produces the same effect as the use of pesticides such as Super Diforce, Lamda- cyhalothrin, cypermethrin, dimethoate, Carbofuran. It appears from this study that the best productions (grain) were obtained on 7 treatments and are in order of importance: Stunting is a good strategy for the production of biological cowpea because it allows to deprive the larvae and adults of all food along its life thus leading to a breach of insect breeding cycle corresponding phenological stage.

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None.

Conflicts of interest

The authors declares that there is no conflict of interest.

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