International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE)
www.ijasvote-fce.com
Volume 3; Issue 1; July 2026; Page No. 157-175.

POTENTIALS OF WHOLE PLANT EXTRACTS OF GIRDLEPOD (*Mitracarpus scaber* ZUCC.) AND MIXTURE WITH NEEM SEED OIL IN THE MANAGEMENT OF TWO KEY FIELD INSECT PESTS OF COWPEA [*Vigna unguiculata L. (*Walp.)] IN KANO

Nura A.I and Usaini, U. A
Department of Crop Protection, Faculty of Agriculture,
P. M. B. 3011 Bayero University Kano
Corresponding Author: husainkrm89@.gmail.com; 08059809838

ABSTRACT

A research was conducted at the Research Farm of the Center for Dry Land Agriculture (CDA) Bayero, University Kano during the 2019 rainy season. The research was conducted to evaluate the potential of mitracarpus scaber alone and in mixture with neem seed oil in the management of Cowpea insect pest complex. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. the extracts were applied at three different spraying regimes (1) three sprays (2) five sprays and (3) seven sprays, Imi force and untreated plots served as check and control respectively. Data collected were subjected to analysis of variance (ANOVA) using Genstat Discovery Edition statistical package while significant treatment means were separated using least significant differences at 5% level of probability. The result indicated that extract from M+NSO at 7 sprays having high potency which demonstrated a significant control on *A. craccivora*. For the Pod sucking bug population at 7 sprays M+NSO recorded the lowest PSB population. While pod sucking bug damage, number of seed per pod, M+NSO at 7 sprays and MA at 7 sprays had the same result with highest number of seed per pod among the spraying regimes was recorded, but for the wrinkle seed per pod MA at 2 sprays had the lowest wrinkle seed per pod among the extracts. While pod density was observed that at 7 sprays of M+NSO has the highest pod density among the extracts. MA and M+NSO at 7 sprays recorded highest number of pod per plant. M+NSO at 7 sprays recorded the highest yield. The study shows M+NSO at 7 sprays have insecticide potential that can be used for effective management and control of major cowpea insect pest.

• INTRODUCTION

1.1 Background of the Study

Cowpea, (*Vigna unguiculata* (L.) Walp is one of the most important leguminous crops that is widely grown throughout the tropics, especially in the savanna zone of West Africa and other parts of the world (Singh, 1990). Cowpea grain production estimates worldwide is about 4.5

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

million metric tonnes on 12 to 14 million ha. Nigeria is the largest producer and consumer of cowpea grain, with about 5 million ha and over 2 million metric tonnes production annually (Singh 2002; Langyintuo *et al.,* 2003).Cowpea is highly palatable, and very nutritious. The dried seed provides an inexpensive source of protein in many diets in the tropics and sub-tropics (Kay, 1979). Cowpea plays a critical role in the lives of millions of people in Africa and other parts of the developing world, where it is a major source of dietary protein that nutritionally complement staple low-protein cereal and tuber crops, and is a valuable and dependable commodity that produces income for farmers and traders (Singh, 2002; Langyintuo *et. al*., 2003). Cowpea is a valuable component of farming systems in many areas because of its ability to restore soil fertility for succeeding cereal crops grown in rotation with it (Carsky *et. al*., 2002; Tarawali *et. al.,* 2002; Sanginga *et. al*., 2003). Early maturing cowpea varieties can provide the first food from the current harvest sooner than any other crop in as few as 55 days after planting, thereby shortening the "hungry period" that often occurs just prior to harvest of the current season's crop in farming communities in the developing world. Cowpea is referred to as the "hungry-season crop" given that it is among some crops to be harvested before the cereal crops are ready. It is a crop that offers farmers great flexibility.

Cowpea is a very important pulse in Africa. The young leaves, immature pods and shoots are used as vegetables. All parts of the plant used for food are nutritious, providing protein, vitamins and minerals. (Okike, 2000). The cowpea grain contains an average of 23-25% protein and 50-67% carbohydrates (Singh *et. al*., 1997). It has fat content of 1.3% fibre content of 1.8% and 8-9% of water. Because of its high protein content, cowpea is extremely valuable where many people cannot afford high protein foods such as meat and fish (IITA, 2007). In Nigeria, cowpea can be consumed, boiled (as porridge) or boiled and eaten with stew. It can also be ground and processed into flour and used to make many traditional foods: for example, "Akara" (bean balls), "moi-moi" (bean cake) etc (FAO, 2000). In Sudan and Ethiopia, its roots are eaten as vegetable. Also in Ghana, leaves are eaten as vegetable (Asawalam and Dioka, 2012) .Apart from the traditional products, cowpeas are processed into flour for the production of bakery products such as cookies and breads (Kethireddipalli, *et. al*., 2002; Hallen *et. al*., 2004; Mc Watters *et. al*., 2005) as well as meat product such as chicken nuggets (Prinyawiwakul *et. al*., 1997).

The usefulness of cowpea as a fodder plant for hay, silage or pasture has led to more research into its improvement for such use (Singh *et. al*., 2003). It also provides groundcover that suppresses weeds in sole and intercropped plots and offers some protection especially the spreading types of the crop against soil erosion (Lawson *et. al*., 2006). Because of its ability to fix atmospheric nitrogen through symbiosis with nodule bacteria (*Brady rhizobium* species) (Singh *et. al*., 1997), farmers usually do not apply fertilizers to their cowpea fields, although it has been reported that cowpea responds significantly to fertilizers including poultry manure and mineral fertilizers (Agyenim Boateng *et. al*., 2006; Sokoto and Singh, 2008). As a result

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

of its nitrogen- fixing ability, the crop does not deplete the natural (low) reserves of soil nitrogen and many experimental findings illustrate that soil nitrogen increases following cowpea cultivation (Singh *et. al*., 1997). It therefore becomes an integral component of rotational programs due to this attribute. In addition to the above benefits, cowpea provides a reliable source of livelihood to several people particularly women in both rural and urban communities in the production areas and even beyond, through the trading of fresh produce and processed foods from the crop (Singh *et. al*., 1997).

In Nigeria Yield of cowpea is low due to insect pests infestation. The major post - flowering insect pests of cowpea in tropical Africa are the flower bud thrips *Megalurothrips sjostedti* Tryb, Maruca pod borer, *Maruca vitrata* (F.), and pod sucking bugs complex dominated by *Clavigralla tomentosicollis* Stal (Jackai and Daoust, 1986). Complete crop failure may occur where insecticide protection is not introduced especially for improved, high yielding varieties. Efforts to popularize these improved varieties among farmers have been a difficult task due to their high demand for insecticidal sprays, which are expensive for resource limited farmers in Nigeria. The use of chemicals as commonest and widely practiced (Jackai and Daoust, 1986) have been reported in African countries. However, because of serious deleterious side effects such as toxicity to mammals, users, consumers, none target organisms, environmental pollution (Alabi *et. al*., 2003) and high cost of insecticides and equipment (Afun *et. al.*, 1991).

This situation coupled with the current economic hardship in the country which led to the removal of various subsidies formerly enjoyed by farmers have made possible the search for alternative sources of insecticide that would become a component of socio-economically sustainable and environmentally friendly crop protection strategies (Jackai and Oyediran,1991). However, as stated by (Jackai, 1983) and (Amason *et. al*.,1989), there are insecticides of plant origin that can be used without the problems associated with synthetic insecticides.

1.2 Problems Statement

Cowpeas are very attractive to insect pests, whose attack, damage, and limit its production in Nigeria. (Dugje *et. al*., 2009). In the West African sub region, low levels of cowpea yield (200-350 kg/ha) obtained by some farmers are directly attributed to insect pests damage on the field (IITA, 2007). In order to control these insect pests, farmers adopt the use of conventional insecticides which aside from being sometimes wrongly applied may have devastating effect on the environment (Singh *et. al.*, 2004). The indiscriminate use of chemicals has given rise to a number of problems including genetic resistance of the insect pest species, accumulation of toxic residues in treated grains (Singh *et. al*., 2004), which may result in acute and chronic poisoning of consumers, environmental contamination resulting in problems such as destruction of fish, birds, groundwater contamination, other wildlife, the disruption of natural biological control and pollination. Chemical insecticides are also

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

expensive and their use results in increased cost of production (Pretty and Waibel, 2005). These problems have necessitated the search for alternative and effective bio degradable insecticides. The re-evaluation and use of traditional botanical pest control agents (powder, water extracts, oil and wood ash) that local farmers have been using over the past decades, though without much success, seem to provide a clue to local sourcing of pest control strategies. Plant extracts, as bio pesticides, are gaining more popularity because they are inherently less harmful than conventional pesticides (Oparaeke *et. al.,* 2000; Mitchell *et. al.,* 2004). Bio pesticides are often effective in very small quantities and they decompose quickly, thereby resulting in lower persistence and largely without the pollution problems caused by conventional pesticides (Mitchell *et al.,* 2004). This research is designed to provide solution to these problems, for the farmers who cannot afford to buy synthetic insecticides by providing botanical biodegradable insecticide from a locally available plant material in their environment.

1.3 Justification of the Research Problems

Cowpea is one of the most important crops as a source of protein and carbohydrate to the people and their livestock in Nigeria and a source of income to many people in the local areas. Nigeria is a leader of cowpea production in the world but cowpea suffered a lot of damage by insect infestations which limit the cowpea yield greatly in Nigeria. In the process of controlling these pests, the farmers are discriminately using synthetic insecticide which leads to unwanted effects to environment and cowpea grain, which may cause terrible hazard to the people and their environment. However with such great importance of cowpea to Nigeria and the rest of the world these problems need to be address. This research work will focus on the effect of girdlepod (*Mitracarpus scaber)* whole plant powder and *Azadirachta indica* oil on cowpea field pests that attacks the crop at vegetative, flowering and post flowering stages. These insect pest that attack the crop at vegetative, flowering and post flowering stages are *Aphis craccivora, Maruca viterata* , *Megalurothrip sjostedti, and Clavigralla Tomsentosicollis*

.

1.4 Objectives of the Research Work

1. Determined the effect of whole plant extracts of *Metracarpus scaber* and *Azadirachta indica* oil on the population of major field insect pest of cowpea, at study site, and
2. To determine the most effective control treatment and application regimes on the grain yield of cowpea at the study site.

3.0 Materials and Methods

3.1 Study Area

The research work was conducted at Research and Training Farm of the Center for Dry land Agriculture (CDA), Bayero University, Kano 2019, during rainy season. Bu the laboratory

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

work was conducted in Entomology laboratory of the Department of Crop Protection of the Faculty of Agriculture, Byero University Kano.

3.2 Agronomic practices

The intra-row spacing and inter-row spacing was 20cm and 75cm, respectively. Before the commencement of planting field was ploughed, harrowed and ridged. Before sowing, about 2kg seeds was dressed with a sachet of apron plus. Hoe weeding and other agronomic practices of raising good cowpea plants were used. Fertilizer NPK (15:15:15) were used as top dress at 250 kg/ha after 14 days of sowing, (Oparaeke *et. al*., 1999).

3.3 Sources of experimental materials

The plants extracts used were aqueous solution of whole plant of Girdlepod, (*Mitaracarpus scaber)* and *Azadirachta indica seed* oil. The whole plant of *M. scaber* was collected from Bichi local government area in Kano state. It was washed with tap water and dried under the shade. The *Azadirachta indica* oil was purchased at Getso town, Gwarzo Local Government Area, Kano State.

The seed was purchased from the International Institute of Tropical Agriculture (IITA) Kano sub-station.

3.4 Preparation of the *M.scaber* Extracts

About 500g of dried *M. scaber* stem and leaves were pound using wooden mortar and pestle. The powder was soaked in 3.5 l of water in plastic buckets and kept overnight, filtered early in the morning with 1.0 l of water using a muslin cloth. The filtrate passed in to a knapsack and was used to spray the cowpea plants as described by (Oparaeke *et. al*., 2000). The preparation of *M. scaber* and neem seed oil mixture were done by addition of 2ml of liquid soap to the prepared *M. scaber* extract followed by 5ml of neem oil. The mixture was stirred slowly (Author, 2012).

3.5 Treatments Combination

The three treatments were applied to a variety of Cowpea IT90K-277-2. It is chosen for its preference by the farmers and it's highly susceptibility to insect pest attack (Monfankye, 2014). The treatments were *M. scaber* alone, Mixture of neem seed oil and *M. scaber*, Imi force (Imida cloprid) 1 l/h and untreated served as check and control. All treatments were sprays according to the following four spraying regimes; three for botanical and one for synthetic chemical. (1) Three sprays, at ten days after planting, at bud initiation and 50% flowering. (2) Five sprays, at ten days after planting, at 21 days after planting, bud initiation, 50% flowering and 50% podding. (3) Seven spray at ten days after planting, at 21 days after planting, bud initiation, 50% flowering, full flowering, 50% podding, and full podding. For chemical sprays was at bud initiation, 50% flowering, and 50% podding.

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

3.6 Field Layout and Experimental Design

Each treatment had three plots per replication, in which made twelve treatment combination per replication, they were used against variety of Cowpea. The experimental design was used is randomize complete block design (RCBD) with total of twelve treatments replicated three times, forming thirty six plots. Each plot was 2 by 3m with 2m between two replications and 2m between the plots. All the twelve treatments were allocated randomly to the plots. The field net area was 216m^2 with 598m^2 as total gross area.

3.7 Insect Observation and Data Collection

Observations on the incidences of different Cowpea insect pests were made on the insect that attack cowpea at three growing stages pre flowering, flowering and post flowering stages, all the insect pest were recorded on tagged plants.

3.7.1 Pre flowering insect pest sampling

Aphid infestation was monitored once a week, where Scoring for the pest was done twice times at 10, and 17, days after planting. Visual infestation rating scale 0 - 4 was used on a tagged five cowpea plants for each plot and average scores per plant calculated. (Litsinger *et al.,* 1977)

Table 3.1: Aphid scoring chart

SCORE	SYMPTOMS
0	No attack
1	1-10 aphids
2	11-20 aphids
3	21-30 aphids
4	> 30 aphids

3.7.2 Insect sampling at flowering stage

Five plant stands per plot were randomly selected and tagged within the middle rows of each plot. The target insect pests at this observation were *M. sjostedti* and *M. vitrata*. The incidences of these insect pest were assessed weekly from flower bud initiation to first pod maturity stage, done between to 6.30 7 to 9.30 in the morning every seven days. Flower bud thrips (*Megalurothrips sjostedti*) and legume pod borers (*Maruca vitrata* Fab.) were sampled by random picking of 5 flowers from plants in each plot (Amatobi, 1994). The flowers were placed in vials containing 30 % alcohol and taken to the laboratory where they were dissected the next day and the number of each pest found was recorded. Pod density (a measure of efficacy of control material against thrips / borer larvae infestation on flowers) was assessed at 70 days after planting by counting pods produced from a random sample of 5 plants per plot. Pod damage assessment involved counting the number of damaged pods per plant and dividing by the total number of pods produced per plant in a randomsample of 5 plants per plot. These were expressed in percentages by multiplying by100, according to the method used by (Oparaeke *et al*., 2005).

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

3.7. 3 Insect sampling at post flowering stage

Clavigralla Tomsentosicollis **(Pod sucking bugs)** The number of PSBs that rested on cowpea in the two middle rows of each plot was recorded in the morning (8 to 10 a.m.) at 45 days after plantig. Two observations were made at 7 days intervals. Damage to pods and seeds by pod sucking bugs was assessed by examining the pods and seeds in the laboratory. Cowpea pods in the two middle rows in each plot were harvested at maturity into medium size black polyethylene bags according to plot number and were sundried for one week. From each bag, 5 pods were hand-picked randomly. Each was measured with a flexible thread to determine its length. Each pod was then opened with hand. The number of seeds per pod, aborted seeds per pod, wrinkled seeds per pod and seeds with feeding lesions per pod were observed, recorded and the mean calculated according to the method used by (Egho, 2011).

3.7.4 Yield and yield related components

Number of pods per plant At 60 days after planting, when pods were fully filled and partially matured but still green. Two long sticks were used to mark out one meter long distance in the two middle rows of each plot. Cowpea pods and their stands which occupied this distance were counted. The number of pods was divided by the number of plant stands as shown below (Egho, 2011).

$$\text{Number of pod per plant} = \frac{\text{number of pod}}{\text{number plant stand}}$$

At 70 days after planting the pods were harvested according to treatments plots with hands into black polyethylene bags. They were sundried for 2 weeks and shelled with hands. The grains were then weighed with triple beam balance and weights recorded. The yield per plot was weighted in kilogram per hectare. One hundred seeds were hand-picked from the grains in each bag (plot); they were weighed and the weight recorded. (Egho, 2011).

3.8 Data Analysis

Data collected were subjected to analysis of variance (ANOVA) using Genstat Discovery Edition statistical package while significant treatment means were separated using least significant differences at 5% level of probability.

RESULT AND DISCUSSION

4.1 RESULTS

4.1.1 Effect of Mitracrpus *scaber* alone and in mixture with Neem seed oil on Pre-flowering insect pest infestation (*Aphis craccivora*) in Kano

The effect of *Mitrcarpus scaber* alone and in a mixture with Neem seed oil for the control of major insect pests of cowpea in Kano state, as presented in Table 1 shows the mean population of *aphid craccivora* was not significantly different between the treated and untreated plots a day before application. But there were significant differences at seven days after treatments application as shown between treated and untreated plots. SC had the lowest

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

insect pest population with mean number (0.166) but was statistically similar with all the botanicals at their different spraying regimes while the highest insect pest population occurred in the untreated plots (1.633).

4.2.2 Effect of *Mitracarpus scaber* alone and in a mixture with Neem seed oil on cowpea infestation by key insect pest at flowering stage in Kano

The result in Table 2 shows that at a day before treatments application there was no significant difference between the treated and untreated plots for maruca and thrip infestation while at 7 and 14 days after application of treatments, all botanicals, their spraying regimes and SC did not significantly differ from each other in the mean number of maruca and thrip infestation.

Table 1: Effect of *Mitrcarpus scaber* alone and in a mixture with Neem seed oil on cowpea pre flowering insect pest infestation (*Aphis craccivora*) in Kano

Treatments	SPR	Days to and after sprays	
		1Day before sprays	Seven days after
		Aphid	Aphid
MA	1	2.00	0.600a
	2	1.67	0.600a
	3	2.13	0.400a
M+NSO	1	1.46	0.200a
	2	1.87	0.200a
	3	2.73	0.533a
SC		2.53	0.167a
UC		1.90	1.633b
Level of significance		ns	**
LSD (P<0.005)			0.61

Means followed by the same letter are statistically not significantly different at 5% level of probability using least significant differences. MA = mitrcarpus scaber alone, M+NO = *mitracarpus scaber* + neem seed oil, SC = synthetic chemical, UC = untreated control and LSD = least significant differences and ** = significant at one 1% level of probability.

Table 2 Effect of *Mitracarpus scaber* alone and in a mixture with Neem seed oil on cowpea infestation by key insect pest at flowering stage in Kano

Treatments	SPR	Days to and after sprays					
		A day before spray		Seven days after		Fourteen days after	
		Maruca	Thrip	Maruca	Thrip	Maruca	Thrip
MA	1	6.67	0.33	3.67	0.00	3.67	2.00
	2	6.00	1.67	6.67	0.33	2.67	0.00
M+NSO	1	7.00	1.67	4.67	0.10	5.00	0.67

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

	2	3.33	0.33	6.67	0.00	5.00	1.33
	3	5.33	1.67	4.23	0.00	3.33	0.00
SC		5.33	1.00	4.23	0.00	4.67	0.33
UC		5.33	0.3	6.00	2.87	4.33	0.43
Level of significant		ns	ns	ns	ns	ns	ns
LSD (<P0.005)							

4.1.3 Effect of *Mitracarpus scaber* alone and in a mixture with Neem seed oil on cowpea infestation by post flowering insect pest PSB (*Clavigralla Tomentosicollis*)

Table 3 shows the result on the mean population of PSB (*Clavigralla Tomentosicollis*), all treatments are not significantly difference from each other in reducing mean population of PSB a day before application of treatments and at 7 days after application.

At 14 day after application the result indicated there was significance difference between treated and untreated, lowest insect population occurred in the SC (0.40) and M+NSO at 2 SPR (0.67) which had similar result. While untreated (4.33) and MA at 1 SPR (4.33) had similar result and had the highest insect pest population. M+NSO at 3 SPR (1.00), MA at 3 SPR (1.33), and MA at 2 SPR (1.33), they had lower pest population and had similar result with SC while high insect population occurred on plot treated with M+NSO at 1 SPR but were lower when compared with UC.

4.1.4 Effect of *mitracarpus scaber* alone and in a mixture with Neem seed oil on cowpea Maruca pod damage and pod density

Table 4 shows the result on number of pod damage by *Maruca vitrata,* it shows no significant difference between all the treated and untreated plots.

Pod density has shown SC had the highest pod density (46.83) while UC had the lowest pod density. M+NSO at 3 SPR (43.60) had similar result with SC and had highest pod density among botanical which was also had similar result with MA at 3 AASPR. In the same vain MA at 3 SPR had similar result with M+NSO at 2 SPR, and MA at 2 SPR, followed MA at 1 SPR, and M+NSO at 1 SPR, they had the lowest pod density and are similar with UC.

4.1.5 Effect of *mitracarpus scaber* alone and in a mixture with Neem seed oil on cowpea pod damage by pod sucking bug *(Clavigralla Tomentosicollis)* in Kano

As presented in Table 5 the result on damage by PSB on shows there was no significance difference between treated and untreated plots after treatment application.

The result on Number of seeds per pod indicated that M+NSO at 1 SPR (12.67) had highest number of seed per pod but was statistically similar with SC and all the remaining botanicals while UC had lowest number of seed per pod (10.00).

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

Aborted seed per pod did not show any significance difference between treated and untreated plots after treatments application.

Wrinkle seed per pod number result indicated SC (0.00) and MA at 3 SPR had no wrinkle seed per pod (0.00) but was statistically similar to M+ NSO at 3 SPR (0.33), M+ NSO at 1 SPR (1.00), M+ NSO at 2 SPR (0.67) , MA at 1 SPR(0.67) while MA at 2 SPR (1.33) had higher wrinkle seed per pod and was similar with the UC (1.67).

The means result of Seed with feeding lesion after treatments application shows no significance difference between treated and untreated plots.

Table 3 Effect of *Mitracarpus scaber* alone and in a mixture with Neem seed oil on cowpea infestation by post flowering insect pest PSB (*Clavigralla Tomentosicollis*)

Treatments	SPR	At days after sowing	
		45DAS	52DAS
MA	1	1.67	4.33a
	2	2.67	1.33bc
	3	0.67	1.33bc
M+NSO	1	2.33	2.33b
	2	0.67	0.67c
	3	1.00	1.00bc
SC		0.97	0.40c
UC		3.53	4.33a
Level of significant		ns	**
LSD (<p0.005)			1.49

Means followed by the same letter (s) are statically not significantly different at 5% level of probability using least significant differences. MA = mitrcarpus scaber alone, M+NO = *mitracarpus scaber* + neem seed oil, SC = synthetic chemical, UC = untreated control and LSD = least significant differences and ** = significant at one 1% level of probability.

Table 4 Effect of *mitracarpus scaber* alone and in a mixture with Neem seed oil on cowpea Maruca pod damage and pod density

Treatments	**SPR**	**Maruca Pod damage**	**Pod density**
MA	1	7.4	37.87def
	2	10.60	39.47cde
	3	6.23	42.00bc
M+NSO	1	13.57	36.87ef
	2	6.10	40.80cd

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

	3	6.27	43.60ab
SC		4.70	46.83a
UC		11.67	35.70f
Level of significant		Ns	**
LSD (<0.005)			3.35

Means followed by the same letter (s) are statically not significantly different at 5% level of probability using least significant differences.MA = *mitrcarpus scaber* alone, M+NO = *mitracarpus scaber* + neem seed oil, SC = synthetic chemical, UC = untreated control and LSD = least significant differences and ** = significant at one 1% level of probability.

4.1.6 **Effect of *Mitracarpus scaber* alone and in a mixture with Neem seed oil on pod density and grain yield of cowpea in Kano state**

Table 6 results shows 100 seed weight after treatment application, the result indicates there was no any significance among the treatments.

The result on the number of pod per plant shows SC had highest number of pod per plant (42.17) while the lowest was UC plot (30.50). Among the botanicals MA at 3 SPR had the highest number of pod per plant but had similar result with M+NSO at 3 SPR, MA at 3 SPR, and MA at 2 SPR while lower number of pod per plant were obtained from plots sprayed with M+NSO at 1 SPR, and M+NSO at 2 SPR and were similar with the UC.

The result on Grain yield per hectares show SC had the highest yield per hectare (950.9kg/ha), while UC had lowest yield (349.8kg/ha). In term of the botanicals M+NSO at 3 SPR had the highest yield (800kg/ha), followed by M+NSO at 2 SPR(740.6kg/ha), MA at 3 SPR (662.8kg/ha) while lower yields were obtained from MA at 2 SPR and MA at 1 SPR but had higher yields than the UC.

Table 5 Effect of *mitracarpus scaber* alone and in a mixture with Neem seed oil on cowpea pod damage by pod sucking bug *(Clavigralla Tomentosicollis)* in Kano

Treatments	SPR	pod length	Number of seed per pod	Aborted seed per pod	Wrinkle seed per pod	Seed with feeding lesion
MA	1	14.63	11.33b	1.33	0.67abc	0.600
	2	14.47	11.67ab	1.67	1.33ab	0.600
	3	16.10	11.67ab	1.00	0.00c	0.400
M+NSO	1	15.19	12.67a	1.33	1.00abc	0.533
	2	14.50	11.67ab	2.33	0.67abc	0.467
	3	16.00	12.33ab	1.67	0.33bc	0.267
SC		16.97	12.33ab	1.33	0.00c	0.433

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

UC	14.23	10.00c	2.67	1.67a	0.800
Level of significant	Ns	**	ns	*	ns
LSD(<P0.005)		1.18		1.02	

Means followed by the same letter(s) are statically not significantly different at 5% level of probability using least significant differences.MA= *mitrcarpus scaber* alone, M+NO = *mitracarpus scaber* + neem seed oil, SC = synthetic chemical, UC = untreated control and LSD = least significant differences ** = significant at one 1% level of probability, and significant at one 5% level of probability.

Table 6 Effect of *Mitracarpus scaber* alone and in a mixture with Neem seed oil on pod density and grain yield cowpea in Kano state

Treatment	SPR	100seed	Number of pod	Grain yield
MA	1	17.67	36.53de	461.8f
	2	17.67	38.63bcd	465.3f
	3	19.67	39.95b	662.8d
M+NSO	1	17.67	37.66cde	557.9e
	2	18.67	35.90e	740.6c
	3	18.67	39.47bc	800.5b
SC		20.10	42.17a	950.9a
UC		17.30	30.50f	349.8g
Level of significance		Ns	**	**
LSD (<P0.005)			2.22	46.01

Means followed by the same letter (s) are statically not significantly different at 5% level of probability using least significant differences.MA = *mitrcarpus scaber alone*, M+NO = *mitracarpus scaber* + neem seed oil, SC = synthetic chemical, UC = untreated control and LSD = least significant differences and ** = significant at one 1% level of probability.

4.1.7 Interaction on effect of *mitracarpus scaber* alone and in a mixiture with neem seed oil on number of pod sucking bugs *(Clavigralla Tomentosicollis)* in Kano

Table 7 shows the interaction between MA, M+NSO and their 3 different spraying regimes in Kano. As presented in table 7, M+NSO at 2 SPR had the highest effect in reducing PSB population but had similar result with MA at t 3 SPR, MA at 2 SPR, MA at 3 SPR, M+NSO at 1 SPR. while MA at 1 SPR had the highest PSB population among them.

4.1.8 Interaction on effect of *mitracarpus scaber* alone and in a mixture with neem seed oil on grain yield of cowpea kg per hectare in Kano

Table 8 shows all treated plots were significantly difference with each other M+NSO at 3 SPR had the highest yield in kg per hectare (800.5) followed by M+NSO at 2 SPR, MA at 3 SPR, M+NSO at 1 SPR, while M+NSO at 2 SPR and MA at 1 SPR had similar result and lowest yield per kg among treatment.

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

Table 7 Interaction on effect of mitracarpus scaber alone and in a mixiture with neem seed oil on number of pod sucking bugs *(Clavigralla tomentosicollis)* in Kano

Treatment	Spraying regimes numbers		
	1	2	3
MA	4.33a	1.33bc	1.3bc
M+NSO	2.33bcb	1.00c	1.67bc
Level of significant		*	
LSD (<0.005)		1.29	

Means followed by the same letter (s) are statically not significant. MA = *mitrcarpus scaber* alone, M+NO = *mitracarpus scaber* + neem seed oil, SC = synthetic chemical, UC = untreated control and LSD = least significant differences and * = significant at one 5% level of probability.

Table 8 Interaction on effect of mitracarpus scaber alone and in a mixture with neem seed oil on grain yield of cowpea kg per hectare in Kano

Treatment	Spraying regimes numbers		
	1	2	3
MA	461.8e	465.3e	662.8c
M+NSO	557.8d	740.6b	800.5a
Level of significant		**	
LSD (<P0.005)		44.62	

Means followed by the same letter are statically not significant. MA = *mitrcarpus scaber* alone, M+NO = *mitracarpus scaber* + neem seed oil, SC = synthetic chemical, UC = untreated control and LSD = least significant differences and ** = significant at one 1% level of probability.

4.2.1 The effect of whole plant extracts of *Metracarpus scaber* and in mixture with neem seed oil on the of major field insect pest of cowpea in kano

Plant extracts (aqueous or oil) have been used for pest management worldwide by limited resource farmers and have been found effective in various trials by scientists (OPARAEKE A.M, 2006). The present study had shown that aqueous solution of M+NSO and MA were effective for *Aphid craccivora* on *M. sjostedti* and *C.tomentosicollis* when compare with unprotected plots which had higher population counts and damage than plots threated with botanical.

The result for A. *craccivora* and *thrips* damge, M+NSO application provide good control of the insect pest at (P≤, 0.05) and statically different with control. For second observation there were no *A craccivora* found, this probably attributed to frequent heavy rain, which wash away insect population. This observation agrees with the findings of (Degri *et al.,* 2000) they concluded that *A.craccivora* does not thrive on cowpea under heavy rainfall conditions. But for *C.tomentosicollis* was MA that gave good control of the insect pest. This agreed with work by (William *et al.,* 1996, Fuglie 1998, Gaby, 2000), plant extracts are known to possess

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

toxic organic ingredient that are effective in reducing insect pest population. These results agrees with the findings of (Amatobi, 2000) who reported that crude extracts of cashew leaves and nuts killed *A. craccivora, C.tomentosicollis,* and *M. vitrata* very quickly and reduced their population by about 70% compared to untreated control treatment. It also affirmed the finding of (Opreke, 2007) The high potentials observed under the plant extracts could be attributed to insecticidal properties they contain that are lethal to a wide range of insects including thrips and maruca.

While for *Maruca vetrata* and *M. sjostedti* population showed there were no statistical difference for *Maruca vetrata* and *M. sjostedti* between treated and un treated plots this probably is attributed to freqsuent heavy rain after the treatment application or attributed to nature *M. vetrata* it is use to burrow in to the flower or pod if the extract is contact in nature, the insect probably hide in the flower or pod and escape the action of extracts this similar with work of (Egho,2011) who reported that like the thrip population, mineral oils did not have effect on *M. vitrata*. The flower bud thrip could have been protected from chemicals because it was in its burrows in flower and fruits. The insect usually hides and feeds on flower buds. The chemical may not have got to them in the f lower bud. Furthermore, washing away of the chemical could have occurred (Egho,2011) and (Jackai, 1983) reported that *Maruca* larvae could probably escape effects of chemical due to the ability of the insect to detoxify chemical although no literature on this, he added. It could be that mineral oils as contact insecticide (in mode of action) could not get to the hideouts of *Maruca* larvae and thus rendering the chemical ineffective.

Effect control treatment and application regimes on the grain yield of cowpea in Kano

The yields obtained from plant extracts treated plots were significantly ($p \leq 0.05$) higher than untreated control plots. This is in line with (Panhwar 2002, Fuglie 1998) who reported that plant extracts applied on field cowpea plants increased flower production per plant. On this study among the three different spraying regimes of MA and M+NSO as follow (1) three sprays, at ten days after planting, at bud initiation and 50% flowering. (20 Five sprays at ten days after planting, at 21 days after planting, bud initiation, 50% flowering and 50% podding. (3) Seven spray at ten days after planting, at 21 days after planting, bud initiation, 50% flowering, full flowering, 50% podding, and full podding. Plot treated with M+NSO at 7 sprays was fund to be significantly ($p<0.05$) better than MA, this may be attributed to additional sprays at podding stage, this similar with finding of (Panhwar, 2002) reported that plant extracts application at flowering and pod formation stages reduced the level of infestation of insect pests and increased yield of plants. The results also supported by another views of (Panhwar, 2002) who independently reported that the effect of plant extract on crops yield and yield component is dependent on the effectiveness of the individual plant extract. It would be desirable that economic threshold of the cowpea insect pests at flowering and podding stages be determined in order to make better use of plant extracts (Jackai *et al.,*1992).

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

5.1 CONCLUSION

In conclusion, the result revealed that *mitracarpus scaber* alone and in mixture with neem seed oil has insecticidal potential and can be used in management of Cowpea insect pests. The potentials of this plants extracts provide additional alternative source of bio pesticide in the developing countries where they practice low input agriculture.

Also the result indicated that M+NSO has more effects in insect control management, MA was potent but not effective as M+NSO.

In Nigeria these plants are readily available at people farm as grasses, also available to poor resource farmers, friendly to environment, relatively cheap and easy to apply by none professionals for enhanced cowpea production in Nigeria.

5.2 RECOMMENDATION

Based on the finding the following recommendation were made

Miteracarpus scaber in mixture with neem seed oil could serve as a valuable alternative in the management of field pests of cowpea to the synthetic insecticides which have many negative impacts. It is therefore, recommended to farmers to practice this spraying regime to effectively control such pests. It will also minimize production cost incurred by farmers who spray five to seven times during the cowpea growing season using expensive synthetic insecticides with disastrous environmental consequences to humanity.

REFERENCES

Afun, J.V.K., Jackai, L.E.N. and Hodgson, C.J. (1991) Calendar and monitored insecticide application for the control of cowpea pests. *Crop Protection* **10: 363-370**.

Alabi, O.Y., Odebiyi, J.A. and Jackai, L.E.N. (2003) Field evaluation of cowpea cultivars (*Vigna unguiculata*(L) Walp.) for resistance to flower bud thrips (*Megalurothrips sjostedti* Trybom) Thysanoptera: Thripidae*) International Journal of Pest Management*. (4), 287-291

Allen , T . C ., D i c ke , R . J. and Harris, H . H .; *Sabadilla*, *Schoenocaulon* spp.with reference to its toxicity to houseflies; *Journal of Economic Entomology*; (3):400 – 407; 1944. A m atobi.

Amason, J. T., Philogene, B. J. R. and Morand,P. (1989). Insecticides of Plant Origin: American Chemical Society (A.C.S.) Symposium Series No. 387. A. C.S, Washington DC.

Amatobi, C.I. (1994). Field evaluation of some insecticides for the control of insect pests of cowpea, *Vigna unguiculata* (L.) Walp. In the Sudan Savanna of Nigeria. *International Journal of Pest Management*, **40:** 13-1 7.

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.

Asawalam, E. F. and Dioko, U. J. (2012). Evaluation of toxicity of *Dennitatripetala* Baker F. and *Curcuma longa* L. rhizomes Against Cowpea Seeds *Callosobrucus maculates* (F) Coleoptera: Bruchidae. *Agricultural Science Research Journal*. 2 (6):308-311.

Author, G .**(**2012**).** How to make your own neem oil pesticide**.** Availabel at **https://greenerideal.com**

Carsky R.J., Vanlauwe B., Lyasse O. (2002). Cowpea rotation as a resource management technology for cereal-based systems in the savannas of West Africa. In: Fatokun CA, Tarawali SA, Singh BB, Kormawa PM, Tamo M (eds) Challenges and Opportunities for Enhancing Sustainable Cowpea Production. International Institute of Tropical Agriculture, Ibadan, Nigeria, 252–266.

Degri, M.M. and Hadi, H.M.(2000). Field Evaluation and Economics of some Insecticides against the Major Insect Pest of cowpea (*Vigna unguiculata* (Walp) inBauchi, Nigeria: ESN Occasional Publication 32, (113-118)

Dugje, I.Y., Omoigui, L.O., Ekeleme, F., Kamara, A.Y. and Ajeigbe, H. (2009).Farmers' guide to cowpea production in West Africa. IITA, Ibadan, Nigeria.20 p

Egho (2011) The potentials of mineral oils for controlling the major insect pests of cowpea (Vigna unguiculata (L.) Walp in Asaba, ISSN Print: 2151-7517, ISSN Online: 2151-7525, doi:10.5251/abjna.2011.2.3.454.461 © 2011, ScienceHuβ, http://www.scihub.org/ABJNA

Food and Agricultural Organization(FAO).(2000). Protection of stored bean seeds against *Callosobruchus maculatus* (F.) (Coleoptera: Bruchidae). Edited by Van Rhecnen, H,A,.Prere,W. M. and Magoya, K. p. 23.

Gaby, S. (2000). Natural Crop Protection in the Tropics: 2nd Enlarged and Revised edition. Margraf Verlag Press pp 502.

Fuglie, S.L. (1998). Producing Food without Pesticides: Local Solution to Crops Pest Control in West Africa: Church-World Service, Dakar, Senegal, p. 140.

International Institute of Tropical Agriculture (IITA) 2007 Annual report.(2007). 104pp. Jackai, L. E. N. andDaoust, R. A. (1986).Insect pests of cowpeas.*Annual Review of Entomology* 95– 119.

Jackai, L.E.N., Inang, E.E. and Nwobi, P. 1992. The Potential for controlling post flowering pest of cowpea, Vignaunguiculata (L.) Walp. using neem, Azadirachta indicaA. Juss. Tropical Pest Management, 38 (1) : 56 –60.

Jackai, L.E.N. and C.B., Adalla 1997. Pest Management Practices in Cowpea: Areview. Pages 240-258 in Advances in Cowpea Research, edited by B. B. Singh,D. R. Mohan, Raj, K. E. Dashiell, and L. E. N. Jackai. Copublication of International Institute of Tropical Agriculture IITA and Japan International Research Centre for Agricultural Sciences JIRCAS. IITA, Ibadan, Nigeria.

Jackal, L. E. N. andOyediran, I. O. (1991).The potential of neem, *Azadirachtaindica* (A. Juss.) for controlling post-flowering pests of cowpea, *Vigna unguiculata* (L.) Walp – 1.The pod borer, *Maruca testulalis*.103 – 109.

Jackai, L.E. N. (1983). Efficacy of insecticide applications at different times of day against the
legume pod borer, *Maruca vitrata* (Fab) (Lepidoptera: Pyralidae) on cowpea in Nigeria.
Production Ecology 245 - 251.

Jackai, L. E. N. (1993) The use of neem in controlling cowpea pests, IITA Research No 7. September, 1993

Jackai, L.E. N., Singh, S.R., Raheja, A. K., Wiedijk, F. (1985). Recent trends in the control of cowpea pest in Africa. In: Singh, S.R., Rachie, K. O. (Eds.). Cowpea: Research, Production and Utilisation. Wiley, New York, 233-246.

Kay, D.E. (1979).Food legumes. In: Crop and Product Digest. Tropical Product Institute, London. 46.

Kethired dipalli, P. Y., Hung, C., Phillips, R. D. and McWatters, K. H. (2002). Evaluating the Role ofCell Wall Material and Soluble Protein in the Functionality of Cowpea (*Vigna unguiculata*) Pastes. *Journal of Food Science* (1):53-59.

Langyintuo, A.S., Lowenberg-De Boer, J., Faye, M., Lambert, D., Ibro, G., Moussa, B., Kergna,
A., Kushwaha, S., Musa,S. and Ntoukam, G. (2003).Cowpea supply and demand in West Africa. Field Crops Res 215–231

Mitchell, P. L., Gupta, R., Singh, A. K. and Kumar, P. (2004) Behavioral and developmental effects of neem extracts on Clavigralla scutellaris (Hemiptera: Coreidae) and its egg parasitoid, Gryonfulviventre

Monfankye(2014) of Field Pestson Cowpea (*Vigna unguiculata* (L.)Walp) using Botanicals [Tobacco (*Nicotiana tabacum*) Leaves, Neem (*Azadirachta indica*) Leaves ,Ginger (*Zingiberofficinale*) Rhizomes and Onion (*Alliumcepa*) Bulbs]

Okike, I., (2000). An evaluation of potential adoption and diffusion of improved cowpea in the dry saannahs of Nigeria.IITA. Nigeria.

Oparaeke, A.M., Dike, M.C. and Amatobi, C.I. (2000a.) Field trial of botanical extract for insect pests control oncowpea, *Vigna unguiculata* (L.) Walp. Poster presentation, World Cowpea Research Conference III. (2000 September) 4-7, IITA. Ibadan, Nigeria.

Oparaeke, **M. C. Dike** and **C.I. Amatob I** (2005). Journal of Agriculture and Rural Development in Tropics and Subtropics Volume 106, No.1, 2005, ages 41–48

OPARAEKE A.M. (2006): **The sensitivity of flower bud thrips,** *Megalurothrips sjostedti* Trybom (Thysanoptera: Thripidae)**, on cowpea to three concentrations and spraying schedules of** *Piper guineense* Schum. & Thonn. **extracts**. Plant Protect. Sci., **42**: 106–111.

Oparaeke AM .2007. Toxicity and spraying schedules of a biopesticide prepared from Piper guineense against two cowpea pests. Plant Protection Sciences, 43: 103– 108. OPARAEKE A. M., DIKE M. C., AMATOBI C. I. (1999) Field **evaluation of**

extracts of five Nigerian spices for control of post-flowering insect pests of cowpea, *Vigna unguiculata* (L.) Walp. Plant Protect. Sci., **41**: 14–20.

Rachie, K. O. (1985). Introduction. P. xxi xxviii. Cowpea research, production and utilization. Wiley. New York.

Panhwar SB .2002. Farmers adoption of plant materials for insect control. International service for National Agricultural research. Hague, netherland. 4: 61 – 68.

Pretty, J. and Waibel, H. (2005) Paying the price: the full cost of pesticides. In: Pretty, J.(Ed.). The Pesticide Detox.Towardsa more Sustainable Agriculture.Earthscan, London. pp 39-54.

Prinyawiwakul, W., Beuchat, L. R., McWatters, K. H. and Phillips, R. D(1997b)Physiocochemical and sensory properties of chicken nuggets extended with fermented Cowpea and peanut flours. *Journal of Agricultural and Food Chemistry* 45, 1891 – 1899.

Sanginga N, Dashiell KE, Diels J, Vanlauwe B, Lyasse O, Carsky RJ, Tarawali S, Asafo-Adjei B, Menkir A, Schulz S, Singh BB, Chikoye D, Keatinge D, Ortiz R (2003) Sustainable resource management coupled to resilient germplasm to provide new intensive cereal–grain–legume–livestock systems in the dry savanna. *Agricultural Ecosystem Environment* 100:305–314s

Singh BB, Ehlers JD, Sharma B, Freire Filho FR (2002) Challenges and Opportunities for Enhancing Sustainable Cowpea Production. International Institute of Tropical Agriculture, Ibadan, Nigeria, pp 22–40.

Singh, S.R. (1990). Insect Pests of Tropical Food Crops. International Institute of Tropical Agriculture, Ibadan, Nigeria. John Wiley and Son Ltd. 43 pp **.**

Singh, R. N., Maheshwari M. and Saratchandra, B. (2004).Sampling, Surveillance and Forecasting of insect population for Integrated Pest Management in Sericulture. *International Journal of Industrial Entomology*, **8**: 17 –26.

Tarawali SA, Singh BB, Gupta SC, Tabo R, Harris F, Nokoe S, Fernández-Rivera S, Bationo A,

Manyong VM, Makinde K, Odion EC (2002) Cowpea as a key factor for a new approach to integrated crop–livestock systems research in the dry savannas of West Africa. In: Fatokun CA, Tarawali SA, Singh BB, Kormawa PM, Tamo M (eds) Challenges and Opportunities for Enhancing Sustainable Cowpea Production. International Institute of Tropical Agriculture, Ibadan, Nigeria, pp 233–251.

William, A. and Ambridge, L. (1996). Guide to insect pests of Nigerian crops. Identification: Biology and Control. Natural Resource Institute and Overseas Development Administration; p. 253.

Cite this article as:
Nura, A.I. et. al. (2026). Potentials of Whole Plant Extracts of Girdlepod (*Mitracarpus Scaber* Zucc.) and Mixture with Neem Seed Oil in the Management of Two Key Field Insect Pests of Cowpea [*Vigna Unguiculata L.* (Walp.)] in Kano. *International Journal of Advances in Science, Vocational & Technical Education (IJASVOTE), 3(1)* 157-175.