Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393
DOI: https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

Seasonal Effect on the Yield, Incidence and Damage by Some Pests of Jute Mallow (*Corchorus olitorius* L.) in Nsukka

***Emeka, Ekpereamaka Mary**
Department of Crop Science, University of Nigeria, Nsukka
Corresponding author: okoroekpereamaka@gmail.com
ORCID ID: https://orcid.org/0009-0007-3539-482x

Echezona, Bonaventure Chukwujindu
Department of Crop Science, University of Nigeria, Nsukka
bonaventure.echezona@unn.edu.ng
ORCID ID: https://orcid.org/0009-0000-9899-5840

Baiyeri, Kayode Paul
Department of Crop Science, University of Nigeria, Nsukka
paul.baiyeri@unn.edu.ng
ORCID ID: https://orcid.org/0009-0001-8969-8358

Okee, Joshua Ikabi
Department of Crop Production, Prince Abubakar Audu University, Anyigba
okee.ji@ksu.edu.ng;
ORCID ID: https://orcid.org/0009-0001-7179-7817

Abstract
Objective: This study investigated the seasonal effects on the yield, incidence, and insect damage of jute mallow (*Corchorus olitorius* L.) in Nsukka. The experiment aimed to identify the specific pests associated with different planting cycles and assess how seasonal variations influence crop growth and vulnerability to infestation.

Method: The experiment compared early- and late-planting seasons to assess variation in growth and pest pressure. Data were collected on various parameters, including leaf number, stem girth, flowering rate, and specific indicators of insect damage, such as leaf perforations and the total number of pests per plant. Observations were recorded at 4, 6, and 8 weeks after planting (WAP) to determine significant interactions between season and crop variety.

Result: The results identified *Acrea terpsicore* (leafworms) and *Podagrica spp*. (flea beetles) as the primary early-season pests, while *Zonocerus variegatus* (variegated grasshopper) dominated the late season. Early-season crops produced significantly more leaves at 8 WAP and wider stem girths at 6 and 8 WAP. However, these early crops also suffered significantly higher damage, characterised by more leaf perforations at 4 and 8 WAP, more non-perforation leaf damage at 4, 6, and 8 WAP, and a higher percentage of damage incidence at 6 and 8 WAP compared to late-season plantings.

Conclusion: The study concludes that while the early season favours growth parameters such as leaf production and stem width, it also experiences substantially higher pest pressure and damage incidence. Significant interactions between season and variety regarding flowering, leaf count, and perforation levels suggest that variety selection must be tailored to the specific planting season. These findings provide a basis for developing season-specific pest management strategies for jute mallow cultivation in the Nsukka region.

Keywords: Jute mallow (*Corchorus olitorius*), seasonal effect, insect pest incidence, leaf damage, yield parameters

Introduction

Field insects such as jute semilooper (*Anomis sabulifera* Guen.), leaf worms (*Acrea terpiscore* L.), variegated grasshopper *(Zonocerus variegatus* L.), etc., are known to inflict damage to the jute plant during its growth. Some researchers believed that the noxious pests of mallow jute are nematodes from the genus Meloidogyne, leaf-eating beetles and caterpillars (Gotyal et al*.,* 2014; ICAR 2016; Musa, 2020), but to Pitan et al. (2008) and Danjuma et al. (2022), the most damaging pests were grasshoppers (*Zonocerus variegatus*), leafworm (*Acrea terpsicore* L.), army worm (*Spodoptera littoralis*) and flea beetles (*Podagrica spp*.). NIHORT (2021) stated that during the dry season, red spider mites (*Tetranychus cinnabarinus*) often attack the leaves. According to Abdul et al. (2019), *A. sabulifera* can feed up to 90% jute leaf, resulting in 50% fibre loss.

Jute is a crop that grows for around four months in a rain-fed situation during the summer to early season (mid-March to the end of July). Late-season farming, characterised by the absence of rainfall, begins in late October and runs through late March (Adeite, 2021). Vanguard (2021) added that another advantage of late-season farming was that diseases and pests were less virulent during the late season, hence increasing yield per ha. *Corchorus olitorius* performs best during the early season in the Savannah and Sahel vegetation zones (Vanguard, 2017). Sahidur and Matiyar (2012) noted that rainfall was found to be favourable for the proliferation and incidence of grey weevil (*Myllocerus discolour* Bohemus) and had a negative effect on the incidence of stem weevil and yellow mite. Therefore, climatic factors, particularly temperature, relative humidity, and rainfall, played a pivotal role in the occurrence and distribution of different pests on the jute crop.

Xue-Feng et al. (2016) observed that annual climatic conditions can significantly affect the incidence of rice pests and diseases. Hasanuzzaman et al. (2014) defined late jute seed production technology as the cultivation of jute for seed production from mid-August to mid-September. This research is significant for identifying solutions to revive the production of *Corchorus olitorius*, which has been reported to be in decline despite its high nutritional content (Nyadanu et al., 2017). The background objective of this study was to assess seasonal effects on yield, incidence and damage by some pests of Jute mallow (*Corchorus olitorius*) in Nsukka.

Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393
DOI: https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

Materials and Methods

This experiment was carried out in two seasons: late-season (irrigated) farming between November 2022 and March 2023, and early-season farming between April and September 2023, and was arranged as a split-split plot in a randomised complete block design. Mainplot treatments consist of Early and Late season planting, Subplot treatments are made of four (4) varieties of *Corchorus olitorius,* namely: improved varieties NHCO6, NHCO9 and two Local Varieties (Var 1 and 2), while the Sub-subplot treatments were in three levels, namely: organic fertiliser (poultry manure), inorganic fertiliser (NPK 20:20:20) and control. However, the authors wished to publish findings on the first-order interaction between season and variety in a split-split plot. The prevailing annual mean temperature in Nsukka during the research period was 29-30 °C, and the relative humidity was 69-79%. Annual rainfall in Nsukka ranged between 1129 mm and 1141 mm. Data on growth, pest damage, and yield parameters of *C. olitorius* were subjected to analysis of variance (ANOVA) using GenStat 12th edition. To ensure normality of insect counts and percentage damage, the data were transformed prior to analysis of variance. Mean separations were performed using Fisher's least significant difference, as outlined by Obi (2002).

Results

Table 1: Meteorological Data Showing Mean Monthly Rainfall (mm), Temperature (ºC), and Relative Humidity (%) of the Study Area (Crop Science Research Farm), Nsukka

		Temperature (ºC)		Rainfall (mm)	Relative Humidity (%)
Year	Month	Max	Min		
2022	November	36	19	12.3	69
2022	December	35	19	0.00	54
2023	January	35	17	0.00	58
2023	February	38	22	0.00	57
2023	March	37	26	38.6	64
2023	April	35	27	58.7	70

Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393
DOI: https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

		Temperature (ºC)		**Rainfall (mm)**	**Relative Humidity (%)**
Year	**Month**	**Max**	**Min**		
2023	May	34	24	101.3	76
2023	June	33	26	258.2	83
2023	July	30	22	278.4	87
2023	August	31	23	262.1	85
2023	September	32	22	131.3	84

Source: Crop Science Meteorological station, Nsukka (2022-2023)

The results in Table 1 indicate that rainfall in 2023 began in March and peaked in July 2023. The months of June, July and August were the periods of heavy rainfall in 2023, while there was no rainfall from December 2022 till February 2023. December 2022 recorded the lowest relative humidity of 54%, while July 2023 recorded the highest at 87%. In February 2023, the maximum temperature reached 38 °C, but in January 2023, the minimum temperature was 17 °C.

Table 2: Effects of Season, Varieties, and their Interaction on the Growth Parameters of Jute Mallow at 2, 4, 6 and 8 Weeks After Planting

Treatments	**No of leaves/plant WAP**				**Stem girth (cm) WAP**				**No of flowers/plants**		
	2	**4**	**6**	**8**	**2**	**4**	**6**	**8**	**4**	**6**	**8**
Season (S)											
Early	13.65	114.1	252.2	447.8	1.38	2.95	3.97	5.85	0.75	0.93	2.07
Late	20.51	89.9	207.9	312.4	1.37	2.55	3.58	3.65	1.73	2.63	2.84
F-LSD $_{(0.05)}$	5.20^a	NS	NS	76.29^a	NS	NS	0.21^a	1.01^a	0.48^a	0.57^a	0.53^a
Varieties (V)											

Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393 **DOI:** https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

Treatments	**No of leaves/plant WAP**				**Stem girth (cm) WAP**				**No of flowers/plants**		
	2	**4**	**6**	**8**	**2**	**4**	**6**	**8**	**4**	**6**	**8**
Season (S)											
L. var. 1	15.64	89.9	206.5	304.7	1.54	2.85	3.81	4.81[c]	1.10	1.62	1.60
L. var. 2	20.35	123.7	248.5	503.3	1.30	2.79	3.57	4.56	1.27	1.77	2.23
NHCO6	15.58	94.4	235.8	342.8	1.32	2.54	3.83	4.56	1.29	1.84	2.99[c]
NHCO9	16.77	99.9	229.4	369.6	1.35	2.82	3.89	5.07	1.30	1.90	2.99[c]
F-LSD $_{(0.05)}$	NS	15.07[a]	NS	92.12[a]	0.17[a]	NS	NS	0.41[a]	NS	NS	0.41[a]
Interaction											
S x V	NS	NS	NS	117.52	NS	NS	0.42	NS	NS	0.49	0.56

F-LSD- L = Fisher's least significant difference at 5% level of probability, NS= not significant, a = significantly different, b = non-significant, c = statistically the same

The results in Table 2 revealed that season influenced the growth parameters of *C. olitorius*, including the number of leaves per plant at 2 and 8 WAP, the stem girth at 6 and 8 WAP, and the number of flowers per plant at 4, 6, and 8 WAP. From the table, late-season crops significantly produced a higher number of leaves at 2 WAP and a higher number of flowers per plant at 4, 6, and 8 WAP compared to early-season crops. However, early-season crops had more leaves per plant at 8 WAP and wider stem girths at 6 and 8 WAP, which differed significantly from those recorded for late-season crops. The results also showed that local variety 2 produced significantly more leaves per plant at 4 and 8 WAP. On stem girth, local variety 1 and variety NHCO9 significantly recorded higher values at 2 and 8 WAP, respectively, compared to the other varieties, while variety NHCO9 and NHCO6 had the same value on the number of flowers per plant, significantly different from the number of flowers produced by the other varieties.

Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393
DOI: https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

Table 3: Description of Some Insect Pests Sampled for *C. olitorius* plants and Damage Caused as Observed During the Time of Planting

S/N	Insect pest species	Insect pests (Common name)	Plant part attacked	Preponderance season	Devastating pest stage	Major/Minor
1.	*Zonocerus variegatus*	Variegated grasshopper	Shoot and leaves	Late season	Nymphs and adult	Major
2.	*Zonocerus variegatus*	Variegated grasshopper	Shoot and leaves	Early season	Nymphs and adult	Minor
3.	*Acrea terpsicore*	Leafworm	Leaves, shoot and pods	Early season	Caterpillar	Major
4.	*Acrea terpsicore*	Leafworm	Leaves, shoot and pods	Late season	Caterpillar	Minor
5.	*Podagrica spp.*	Flea beetles	Leaves	Late season	Adult	Minor
6.	*Podagrica spp.*	Flea beetles	Leaves	Early season	Adult	Major
7.	*Anomis sabulifera*	Jute semilooper	Leaves and shoots	Late season	Caterpillar	Minor
8.	*Anomis sabulifera*	Jute semilooper	Leaves and shoots	Early season	Caterpillar	Minor

The results in Table 3 showed that during the early season, leafworms (*Acrea terpsicore* L.) and flea beetles (*Podagrica spp*. Chev) were the prevalent insect pests, while variegated grasshopper (*Zonocerus variegates* L.) was a major pest during the late season. Jute semilooper (*Anomis sabulifera* Guen.) was a minor pest in both seasons. Plant parts attacked were shoots, leaves, and pods. Nymphs and adult stages of *Zonocerus variegatus*, caterpillars of *Acrea terpsicore* and *Anomis sabulifera*, as well as adults of *Podagrica spp*., were the various devastating stages of these pests.

Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393 **DOI:** https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

Table 4: Effects of Season, Varieties, and Their Interaction on the Pest Damage Parameters of Jute Mallow at 2, 4, 6 and 8 Weeks After Planting

Treatments	**Number of leaf perforations/plant WAP**				**Number of insect-damaged leaves other than perforations per plant WAP**				**Number of pests per plant WAP**				**Percentage leaf damage incidence (%) WAP**			
	2	**4**	**6**	**8**	**2**	**4**	**6**	**8**	**2**	**4**	**6**	**8**	**2**	**4**	**6**	**8**
Season (S)																
Early	6.55	48.5	355.0	556.0	3.15	24.1	236.5	263.9	0.90	2.11	3.53	3.93	28.63	27.28	75.71	51.41
Late	2.62	13.6	40.0	54.3	2.49	12.5	29.2	38.8	1.12	1.80	3.33	1.85	19.98	22.04	21.75	20.45
LSD $_{(0.05)}$	NS	31.17	232.14	251.22	NS	10.92	214.2	201.3	NS	NS	NS	1.020	NS	NS	20.930	23.220
Varieties (V)																
L. var. 1	6.72	33.0	231.0	259.5	3.33	19.04	119.9	131.0	1.18	1.82	3.82	2.87	29.71	27.82	48.67	39.18

Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393 **DOI:** https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

Treatments	**Number of leaf perforations/plant WAP**				**Number of insect-damaged leaves other than perforations per plant WAP**				**Number of pests per plant WAP**				**Percentage leaf damage incidence (%) WAP**			
	2	**4**	**6**	**8**	**2**	**4**	**6**	**8**	**2**	**4**	**6**	**8**	**2**	**4**	**6**	**8**
L. var. 2	4.04	38.2	212.0	430.9	2.56	25.10	142.9	186.9	0.77	2.40	3.10	2.79	20.86	26.35	49.15	32.09
NHCO6	3.00	23.3	184.0	286.9	2.29	12.93	134.6	137.2	0.88	1.59	3.34	3.08	23.01	21.40	49.85	36.46
NHCO9	4.58	29.7	163.0	243.3	3.10	16.01	134.1	150.4	1.20	2.03	5.47	2.81	23.63	23.06	47.26	36.00
LSD $_{(0.05)}$	NS	NS	NS	124.43	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Interaction																
S x V	NS	NS	NS	206.72	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

F-LSD- L = Fisher's least significant difference at 5% level of probability, NS= not significant, a = significantly different, b = non-significant, c = statistically the same

DOI: https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

Table 4 indicates that early season crops significantly ($p < 0.05$) produced a higher number of leaf perforations per plant at 4, 6 and 8 WAP, a higher number of insect-damaged leaves other than perforations at 4, 6 and 8 WAP, an increased number of insect pests per plant at 8 WAP and higher percentage leaf damage incidence at 6 and 8 WAP. There were no significant differences among the varieties except for the number of leaf perforations per plant at 8 WAP, where local variety 2 recorded the highest value of 430.9, which was significantly higher than those of the other varieties. The interaction of season and variety also revealed significant differences in the number of leaf perforations per plant at 8 WAP.

Table 5: Interaction Effect of Season and Variety on the Growth and Pest Damage Assessments of *Corchorus olitorius* at 6 and 8 WAP

Treatment		Stem girth (cm)	No of flowers per plant		Number of leaves per plant	Number of leaf perforations per plant
Season	Varieties	6 WAP			8 WAP	
Early	Local var. 1	3.69	0.71	0.98	331.6	457.1
	Local var. 2	3.92^{c}	0.71	1.43	662.4^{a}	836.8^{a}
	NHCO6	3.99^{c}	0.93	2.79^{c}	360.6	497.4
	NHCO9	4.26	1.37	3.07^{c}	436.9	432.9
Late	Local var. 1	3.93	2.52^{c}	2.21^{c}	277.9	62.0
	Local var. 2	3.22	2.83	3.04^{c}	344.3	25.1
	NHCO6	3.66	2.74^{c}	3.18^{a}	325.0	76.4
	NHCO9	3.52	2.44^{c}	2.92^{c}	302.3	53.7
F-LSD $_{(0.05)}$		0.420^{a}	0.490^{a}	0.560^{a}	117.52^{a}	206.72^{a}

F-LSD- L = Fisher's least significant difference at 5% level of probability, NS= not significant, a = significantly different, b = non-significant, c = statistically the same

Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393
DOI: https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

Table 5 shows the interaction between season × variety, where local variety 2, grown during the early season, produced significantly more leaves per plant and more leaf perforations per plant, both at 8 WAP. NHCO9 grown during the early season produced the widest stem girth of 4.26 cm and a higher number of flowers per plant at 6 and 8 WAP. However, during the late season, local variety 2 had the highest number of leaves per plant, an increased number of flowers per plant at 6 WAP and the least number of leaf perforations per plant at 8 WAP, while local variety 1 produced the widest stem girth of 3.93 cm at 8 WAP.

Table 6: The Effect of Season, Varieties, and their Interactions on Yield Parameters of *Corchorus olitorius* at 10 WAP

Treatments	Leaf Area (cm^2)	Leaf Length (cm)	Leaf width (cm)	Pod length (cm)
	10 WAP			
Season (S)				
Early	56.2	7.10	2.34	6.47
Late	120.2	9.05	4.05	4.93
F-LSD $_{(0.05)}$	37.01[a]	NS[b]	0.830[a]	0.430[a]
Varieties (V)				
Local Var. 1	112.4[a]	9.03[c]	3.60[c]	5.51
Local Var. 2	58.2	7.48	2.32	5.63
NHCO6	99.4[c]	9.12[a]	3.25[c]	6.17[a]
NHCO9	82.8[c]	6.66	3.62[a]	5.49
F-LSD $_{(0.05)}$	18.09[a]	0.860[a]	0.490[a]	0.270[a]
Interaction				

Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393
DOI: https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

	Leaf Area (cm^2)	**Leaf Length (cm)**	**Leaf width (cm)**	**Pod length (cm)**
Treatments		**10 WAP**		
S x V	30.31	NS	0.74	0.40

F-LSD- L = Fisher's least significant difference at 5% level of probability, NS= not significant, a = significantly different, b = non-significant, c = statistically the same

Table 6 reveals that late-season crops significantly (*p < 0.05)* yielded larger leaf area of 120.2 cm2 and wider leaf width of 4.05 cm compared to early-season grown crops (56.2 cm^2 and 2.34 cm). However, early-season crops yielded longer pods than late-season crops, all at 10 WAP. Local variety 1 yielded the largest leaf area, variety NHCO6 yielded the longest pod and leaf lengths, while NHCO9 had the widest leaf.

Discussion

Season influenced the growth parameters of *C. olitorius*. The results revealed that late-season crops produced significantly more leaves at 2 WAP and more flowers per plant at 4, 6, and 8 WAP than early-season crops. This could be attributed to the environmental and climatic conditions at the time of planting and supports the observation of Hasanuzzaman et al. (2014), who noted that late jute is grown for seed production from mid-August to mid-September. Early-grown crops, on the other hand, produced significantly more leaves at 8 WAP and wider stem girth at 6 and 8 WAP (*p < 0.05*), suggesting that the crop grows well during the early season, as noted by Vanguard (2017).

Local variety 2 was outstanding among the other varieties in terms of the number of leaves per plant at 2, 4, 6, and 8 WAP, while local variety 1 and NHCO9 independently and significantly (*p <0 .05*) produced wider stem girths at 2 and 8 WAP. However, NHCO6 and NHCO9 had the same mean (2.99) for the number of flowers per plant, which differed significantly from the other varieties at 8 WAP. Differences in individual performance among these varieties may be due to their environmental adaptations and genetic makeup, which, although the same across crop varieties, differ in their expression, as noted by Miko (2008). During the early season, leafworms (*Acrea terpsicore* L.) and flea beetles (*Podagrica spp*. Chev) were the prevalent insect pests, while variegated grasshopper (*Zonocerus variegates* L.) was a major pest during the late season. Jute semilooper (*Anomis sabulifera* Guen.) was a minor pest in both seasons. Plant parts attacked were shoots, leaves, and pods. Nymphs and adult stages of *Zonocerus variegatus*, caterpillars of *Acrea terpsicore* and *Anomis sabulifera*, as well as adults of *Podagrica spp*., were the various devastating stages of these pests. The result also confirmed findings of Pitan *et al.* (2008) and Danjuma *et al.* (2022) that the most damaging pests of jute crops were grasshoppers (*Zonocerus variegatus*), leafworm (*Acrea terpsicore* L.), army worm (*Spodoptera littoralis*) and flea beetles (*Podagrica spp*.).

Early season crops significantly (*p <0 .05*) produced a higher number of leaf perforations per plant at 4, 6 and 8 WAP, a higher number of insect-damaged leaves other than perforations at 4, 6 and

8 WAP, an increased number of insect pests per plant at 8 WAP and a higher percentage of leaf damage incidence at 6 and 8 WAP. This result could be attributed to the high rainfall, relative humidity, and temperature during that period, which favoured insect pest activity during the early season. This corresponds to the observation of Xue-Feng et al. (2016), who noted that annual climatic conditions can significantly affect the incidence of rice pests and diseases. The interaction of season × variety shows that during the early season, the local variety 2 produced the highest number of leaves per plant, but at 8 WAP, it had the highest number of leaf perforations per plant. NHCO9 grown during the early season produced the widest stem girth of 4.26 cm and the highest number of flowers per plant at 6 and 8 WAP. However, during the late season, planting local variety 2 still had the highest number of leaves per plant, the highest number of flowers per plant at 6 WAP, and the lowest number of leaf perforations per plant at 8 WAP, whereas local variety 1 produced the widest stem girth of 3.93 cm. This suggests the unique adaptability of the varieties to the changing environmental conditions, as noted by Xue-Feng *et al.* (2016)

Furthermore, the late-season crops yielded significantly ($p < 0.05$) larger leaf area (120.2 cm2) and wider leaf width (4.05 cm) than early-season crops (56.2 cm2 and 2.34 cm, respectively; Table 6). Higher yield was recorded during the late season more than early season due to weather conditions prevalent during the late season which, in this study had rainfall (0 mm), temperature (17 – 22^oC), and relative humidity (54 - 57%) and could have limited the activities of insect pests as observed by Vanguard (2021).

Another advantage of late season farming was that diseases and pests were less virulent during the late season, hence increased yield per ha. Also, the result in Table 4 indicated that there were significant pest damage in terms of number of leaf perforations per plant at 4, 6, and 8 WAP, number of insect damaged leaves other than perforations per plant at 4, 6, and 8 WAP, increased number of pests per plant at 8 WAP and higher leaf damage incidence at 6 and 8 WAP during the early season compared to pest damage caused during the late season planting. Hence, the yield recorded during the late season was higher in leaf areas and widths. Food plant international (2022) reported that jute plant is an annual crop which requires annual precipitation between 400 and 4 290 mm, temperature between 16.8 and 27.5^oC and relative humidity of 70 and 80% for optimal growth, early season provided all these requirements thereby producing significant higher number of leaves compared to the lower number of leaves produced during the late season but had lower pest damage parameters. Local variety 1 had significantly greater leaf area, whereas NHCO6 had longer leaf and pod lengths, which were significantly different from those of the other varieties at 10 WAP ($p < 0 .05$). This could be attributed to their genetic makeup.

Conclusion

Early-season crops significantly produced a higher number of leaves per plant at 8 WAP and wider stem girths at 6 and 8 WAP compared to late-grown crops, which also significantly had an increased number of leaves at 2 WAP and a greater number of flowers per plant at 4, 6, and 8 WAP. Local variety 2 produced significantly more leaves per plant at 4 and 8 WAP than the other varieties. Season significantly influenced some pest damage parameters as early grown crops consistently and significantly produced more number of leaf perforations per plant at 4, 6 and 8 WAP, increased number of insect damaged leaves other than perforations per plant at 4, 6 and 8

Torkwase Journal of Agricultural Research, Volume 3, Issue 1, January 2026, EISSN: 2006-3393
DOI: https://doi.org/10.5281/zenodo.18347849; **Article History:** Received, 26 October 2025; Revised, 5 December 2025; Accepted, 19 December 2025.

WAP, higher number of insect pests per plant at 8 WAP, and more percentage damage incidence at 6 and 8 WAP.

Acrea terpsicore and *Podagrica spp*. were the major insect pests of *C. olitorius* during the early season, while *Zonocerus variegatus* was the major insect pest during the late season, and *Anomis sabulifera* was of minor status in both seasons. The interaction of season x variety revealed that at 6 WAP, NHCO9 grown during the Early season had the widest stem girth of 4.26 cm and local variety 2 grown during the late season had the highest number of flowers per plant and at 8 WAP, still had the largest number of leaves per plant and highest number of leaf perforations per plant significantly different from other season x variety interaction plot. This work recommends that if the farmer's interest is in seed production, larger and less pest-affected leaves, late season planting with variety NHCO9 will suffice and with available irrigational water, but if his interest is in production of jute for its maximum leaf yield, then early season planting with local variety 2 will be more favourable, although with much insect pest damaged leaves.

REFERENCES

Abdul, S., Shubham, B., Subhrajyoti, R., & Kaushik, C. (2019). Defensive response of *Corchorus olitorius* in relation to infestation of *Anomis sabulifera*. *Journal of Entomology*, *16*, 23–29. https://doi.org/10.3923/je.2019.23.23.29

Adeite, A. (2021). *5 facts about dry season farming in Nigeria you should know*. Babban Gona. https://babbangona.com

Arshdeep, S., & Shimpy, S. (2021). Effect of excess use of fertilizers on insect/pest infestation in *Oryza sativa*: A review. *Journal of Entomology and Zoology Studies*, *9*(5), 246–252. https://doi.org/10.22271/j.ento.2021.v9.i5c.8834

Danjuma, S., Yusuf, S., & Musa, M. M. (2022). Evaluation of plant materials for the control leafworm (*Acrea terpsicore* L.) on jute mallow (*Corchorus olitorius* L.) in Lapai, Southern Guinea Savannah of Nigeria. *Journal of Agriculture and Food Science*, *20*(1), 1–9.

Food Plants International. (2022). *Jute crop production* (Statistical Bulletin, 2022). https://foodplantsinternational.com

Gotyal, B. S., Satpathy, S., Selvaraj, K., Meena, P. N., & Naik, R. K. (2014). Mealybug (*Phenacoccus solenopsis* Tinsley): A new pest in jute crop management strategies. *Popular Kheti*, *2*(3). http://www.popularkheti.info

Hasanuzzaman, M., Mahmood, H., & Mustafa, S. (2014). Diversity and preference of agricultural crops in the cropland agro-forests of southwestern Bangladesh. *International Journal of Agriculture and Crop Sciences*, *7*(7), 364–372.

ICAR. (2016). *Spodoptera exigua (Hubner): Integrated management of fall armyworm in maize* (Technical Bulletin No. 24). National Bureau of Agricultural Insect Resources.

Miko, I. (2008). Phenotype variability: Penetrance and expressivity. *Nature Education*, *1*(1), 137.

Musa. (2020). Jute semilooper (*Anomis sabulifera*) and jute apion/jute stem weevil, characters, nature and control measures. In *Outbreak of Pests and Diseases* (Vol. 20, Issue 2, p. 3). CABI Compendium. https://doi.org/10.1079/cabicompendium.15500

NIHORT. (2021). *Corchorus production guide*. National Horticultural Research Institute.

Nyadanu, D., Amoah, R. A., Kwarteng, A., & Akromah, R. (2017). Domestication of jute mallow (*Corchorus olitorius* L.): Ethnobotany, production constraints and phenomics of local cultivars in Ghana. *Genetic Resources and Crop Evolution*, *64*(6). https://doi.org/10.1007/s10722-016-0438-4

Obi, I. U. (2002). *Statistical methods of detecting differences between treatment mean and research methodology issues in laboratory and field experiment* (2nd ed.). University of Nigeria Press.

Okoye, N. (2020, March 24). Ewedu, more than just a vegetable. *Pharmanews*. https://pharmanewsonline.com

Pitan, O. O. R., Tairu, F. M., & Olatunde, G. O. (2008). Varietal differences in the resistance of *Corchorus olitorius* (Malvaceae) to the flea beetles, *Podagrica spp*. (Coleoptera: Chrysomelidae). *Nigerian Journal of Plant Protection*, *25*, 21–29.

Sahidur, R., & Matiyar, R. K. (2012). Incidence of pests in jute (*Corchorus olitorius* L.) ecosystem and pest-weather relationships in West Bengal, India. *Archives of Phytopathology and Plant Protection*, *45*(5), 591–607. https://doi.org/10.1080/03235408.2011.588053

Vanguard. (2017, April 2). *NIHORT Institute issues guide on production, harvesting of Ewedu vegetable*. The News Nigeria. https://thenewsnigeria.com.ng/2017/04/02/institute-issues-guide-on-production-harvesting-of-ewedu/

Vanguard. (2021, April). Dry season farming: Stakeholders speak on deepening food insecurity. *Vanguard*. https://vanguardngr.com

Xue-Feng, H., Chang, C., Fan, L., Yue-Ya, C., Qing, T., Dian-Ying, M., Liming, L., & Min-Yong, Y. (2016). Effects of different fertilization practices on the incidence of rice pests and diseases: A three-year case study in Shanghai, in subtropical southeastern China. *Field Crops Research*, *196*, 33–50. https://doi.org/10.1016/j.fcr.2016.06.004