Sapientia Global Journal of Arts, Humanities and Development Studies (SGOJAHDS), Vol.8 No.1 March, 2025; p.g. 1 – 10; ISSN: 2695-2319 (Print); ISSN: 2695-2327 (Online)

STUDIES ON SEEDLING EMERGENCE, GROWTH AND YIELD COMPONENT OF *ARGEMONE MAXICANA Linn.* (PRICKLY POPPY) GROWN IN SOKOTO, NIGERIA

[1]ABDULLAHI, A.A. PhD, [2] Prof. AILERO, A.A., [2]RUFA'I, A.M., [2] Prof. SANDA, A.
&
[1]Umar, A.K.
[1]Department of Biology Shehu Shagari College of Education, Sokoto, Nigeria
[2]Department of Plant Science, Usmanu Danfodiyo University, Sokoto, Nigeria
Correspondent Author: email: adamuabdullahi50@gmail.com. 08068329240

ACKNOWLEDGEMENTS
The authors wish to express their gratitude to Tet fund for sponsoring the research.

Abstract
The field experiments were carried nul-during 2023/2024 dry season at Dryland Teaching and Research form Dundaye (Lowland) and Plant Science Garden (Upland)Usmanu Danfodiyo University Sokoto. Located on longitude 50.18E, latitude 13^{o}, 01N, 350 meters above the sea level within the Sudan Savanna agro-ecological zone. The research was conducted to investigate the physicochemical properties of the study area, plant emergence growth and yield parameters of Argemone Mexicana L. The treatment were ladi out in a split plot design and replicated three (3) times. Data were collected for emergence, plant height, number of leaves, branch length, branch width and stem diameter at various weeks after planting. Data was analysed using descriptive statistics. The mean values in terms of emergence, growth and yield parameters. Statistical percentage for Social Science (SPSS) versio 20 software was used to analyse the data and means separated for significance using Duncan multiple Range Test. Results of the physicochemical properties of the soil in the study area reveals Upland soils were lower in contents of emulsion capacity, organic carbon, total nitrogen, potassium, sodium, calcium, magnesium CEC and mineral elements respectively than lowland soils. The results further revealed that emergence, growth and yield parameters investigated were significantly (P<0.05) higher in lowland than upland area. It is therefore recommended that Argemone Mexicana L. be propagated at lowland area for optimum emergence, growth and yield in the study area.

Keywords: Seedling Emergence, Growth, Yield Component, Argemone Mexicana.

INTRODUCTION

Argemone Mexicana L. (Mexican poppy, Mexican prickly poppy) Flowering thistle, cardo or cardosanto is a series of poppy found in Mexico and widely naturalized in many parts of the world. An extremely hardy pioneer plant, it is tolerant to drought and poor soil; It has bright yellow latex, and though poisonous to grazing animals, is rarely eaten, but has been used medicinally by many people including those in the native area, the native of the Western US and part of Mexico (CSIRO, 1999).

Argemone mexicana L. Is a principal weed also a major crop grown in Nigeria which includes legumes, cereals and vegetables etc. *Argemone Mexicana L.* has an inhibitory effect on germination and seedling growth of vegetable and weed residues may affect Bambara growth

(*vigna subterrancea)* and sorghum (*sorghum bicolar)* growth and development because of the inhibitory effects of allele chemicals present (Karikari *et al.,* 2000).

Argemone Mexicana L. is a widespread animal plant primarily associated with agricultural crops and waste lands. It is a major weed of a number of crops. In the tropic and temperate regions and is persistent as it produces a seed bank. In India, in particular, the species is a health hazard and because of the prickliness, is a nuisance to substance farmers. *Argemone maxicana L.* is an annual herb, up to 150cm tall with a slightly branched tap root. The stem is erect, branched, usually prickly, pale bluish-green and exclude an unpleasant-smelling yellow sap when cut. Leaves are alternate, without petioles, more or less stretching the stem, up to 15 cm long, deeply lobe with irregularity toothed, spiny margins, greenish-white veins are conspicuous on the bluish-green upper surface of the leaves, flowers are solid. The whole plant is used to make a tea and as much tea as possible is drink until symptoms disappear (Singh *et al.,* 2010).

In Nigeria, the seed oil is applied to protect wood from termite attack, whereas in India, Mexico and the West Indies the seed oil is sometimes used to make soap, for greasing and for illuminatic. The seed oil of *Argemone Mexicana L.* called "argemone oil" or "Hatkai oil" is sometimes added to mustard oil or sesame oil which may lead to oedema and glaucoma in people who consume the oil. Cattle do not graze the plant as it is spiny, but they can be poisoned if they consume it in hay or the chaff. Sheep and goats eat it when other vegetable are in short supply, the while ostriches reddish it. The value of wool decreases when it is contaminated by the prickly fruits (Saggar *et al.,*1999).

The exotic plant species is one of the main causes of ecological degradation, not only in Nigeria but across the world. With the influx of the plant species, ecosystem may endure reductions in biodiversity, alteration in forage production and changes in ecosystem processes. There is much evidence that the plant species can modify physical or chemical attributes of soil, including inputs and cycling of nitrogen and other elements, soil organic matter and aggregation (Saggar *et al.,* 1999).

In spite of the above, this plant species, there seen to be little or no information on its emergence, growth and yield parameters as well as the soil physicochemical properties. Research of this nature had not been conducted to examine the emergence, growth, and yield parameters of the species (*Argemone maxicana L.*) in the study area. This is coupled with the attendant problems, such as dominating and displacing the native species, becoming weed of crops thus increasing cost of production (labour, herbicide etc). Therefore, this research work is an attempt to generate baseline data on emergence, growth, yield parameters and soil physiochemical properties of the species in the study area.

Materials and Methods

Experimental Sites

Field experiments were carried out during 2024 dry season at the Dry Land Teaching and Research Farm, Dundaye (Lowland) Usmanu Danfodiyo University, Sokoto. and Plant Science Garden UDUS (Upland) Latitude 13^{o}N, longitude 05^{o} E; and lies at an altitude of 350m

above the sea level. It falls in Sudan Savanna agro-ecological zone. The rainfall starts mostly in June and ends in October with a mean annual rainfall of about 726± 24.03mm. The temperatue ranges from 15 to 45^{o}C (105^{o}f), with relative humidity of about 16 – 55.5%. The area has a long dry season characterised by cool dry and dusty wind that blow from North to East. The average highest and lowest wind speeds are in May with 182.25kts and the lowest 59kts by November (Nimet, 2024).

Properties of Soil of the Experimental Sites

To determine the physico-chemical properties of the experimental sites, the entire fields were divided into grids and representative soil sample collected from two depths 0 – 15 and 15 – 30cm a soil auger and hand trowel was used to collect soil. The samples were subjected to physic-chemical analysis in order to determine the texture of the soil and its inherent nutrient status. The composite samples were collected, air dried, sieve and made to pass through 2mm sieve. Total Nitrogen was determined by macro kjeidhal method, available P was determined using Bray P1 method, K, and Na by flame photometer, Ca and Mg were determined by atomic absorption spectrophotonetry, Cation Exchange Capacity (CEC) was determined by normal Ammonium acetate solution.

Trace element lead (Pb), COPPER (Cu), iron (fe), zink (Zn), were determined using absorption spectrophotometer Three soil sample each were collected from the two locations and were packed in a separate labelled nylon bag and transported to the Agriculture Chemical Laboratory, faculty of Agriculture Usmanu Danfodiyo University, Sokoto for soil physicochemical analysis.

Land Preparation

The experimental sites were ploughed, harrowed and levelled manually. A plot of 5m x 5m (25m^{2}), were randomly demarcated at Dundaye (lowland) and plant science garden, UDUS (upland) areas. Irrigation and drainage Channels were laid out to convey water and drain away the excess. The plot was divided into five (5) sub plots that is 1m^{2} were demarcated in four corners and 1m^{2} at the centre. The demarcation on the plot was done with the help of 50m measuring tape and ranging poles.

Plant Sample Collection and Identification

Argemone maxicana L. plant species were collected and identified at Dundaye, Wamakko local government area of Sokoto State. The plants were botanically authenticated at the herbarium of the Life Science based on the procedure for plant identification in the Department of Life Science, Usmanu Danfodiyo University Sokoto, Nigeria using their voucher number.

Planting of Seeds

Seed of *Argemone maxicana L.* were sown a nursery both in UDUS Teaching and Research Farm Dundaye (lowland) and Plant Science Garden UDUS (upland) study areas. Hundred (100) seeds were evenly broadcasted in 5cm^{2} nursery beds and thinly covered with soil and replicated three (3) times (Abdullahi and Aliero, 2005).

Growth Measurement of *Argemone Mexicana L.* at Lowland and Upland Areas

Measurement of plant height, number of leaves, leaf length, leaf diameter (width) and stem diameter (girth) were taken from a sample of individual plants in each three (3) quadrants. Growth measurement begun at six (6) Weeks After Emergence (WAE). This was repeated at two (2) weeks interval up to the end of the growing period (Abdullahi and Aliero, 2005).

Emergence of the Seeds

The rate of emergence was monitored from the date of planting to determine mean per m^2 quadrant were determined. The number of individual plants that emerged was recorded daily, up to 2 weeks after planting (WAP).

Plant Height

Measurement of plant height of 3 tagged plants were taken using a 30cm and 100cm ruler. The growth measurement commenced after six (6) weeks of emergence. This continued at 2, 6, 8, 10, 12, 14, 16, 18 and 20 weeks intervals up to the end of the growing period and mean height was determined.

Number of Leaves per Plant

The number of leaves from 3 tagged plants were counted and recorded after six (6) weeks of planting. This was repeated at 2, 6, 8, 10, 12, 14, 16, 18 and 20 weeks intervals up to the end of the growing period.

Leaf Length

The length of leaves was determined from the top of the leaf stalk by using 15cm/30cm ruler. Sample of 3 tagged plants with different leaves were measured and mean were noted. At sixth weeks, the measurement was taken. This was repeated at 2, 6, 8, 10, 12, 14, 16, 18 and 20 weeks intervals up to the end of the growing period.

Leaf Width

Leaves of sampled plants were measured to determined their width. The measurements were carried out at different positions of the leaves with 15cm ruler. The measurement started at sixth weeks and continued at 2, 6, 8, 10, 12, 14, 16, 18 and 20 weeks after planting (WAP), up to the end of the growing period.

Stem Diameter (Girth)

Stem diameter (girth) of individual plant were measured at six (6) weeks to determine the thickness of the stem. Measurement was carried out using verneer calipper ruler. Mean of 3 tagged plants were recorded and were repeated at 2, 6, 8, 10, 12, 14 16, 18 and 20 week intervals up to the end of the growing period.

Irrigation

During early plant growth irrigation was applied at three days intervals while subsequently irrigation was applied at one-week intervals.

Weeding

Weeding was carried out manually using hand and hoe at two weeks interval to maintain weed free fields.

Pest and Diseases

The incidence of termite was controlled by applying chloropyriphos 20% EC insecticide at the base of the plant at the rate of 1250 ml per 500 liters of water.

Data Analysis

The soil physicochemical properties were analysed using independent T-test. Data collected on emergence was analysed using descriptive statistics. Growth measurements (Height, leave number, Leaf length, Leaf width and Stem diameter Girth size) were obtained. The analysis was carried out using Statistical Package for Social Science (SPSS), version 20.0 software. Significant differences in the treatments mean were separated using Duncan Multiple Range Test.

Results

Table 1: Soil physic-chemical properties of lowland and upland areas of Sokoto

	Lowland		**Upland**	
	Depth (cm)			
	0 – 15	**15 – 30**	**0 – 15**	**15 – 30**
Physical Properties				
Sand (g/kg)	78.09[a]	58.2[b]	81.88[a]	62.5[b]
Silt (g/kg)	10.50[a]	8.58[a]	8.30[a]	7.29[a]
Clay (g/kg)	15.4[a]	11.7[a]	7.07[a]	2.5[b]
Chemical Properties				
pH	$5.95^{a} \pm 0.61$	$5.85^{a} \pm 0.62$	$6.78^{a} \pm 0.55$	$6.29^{a} \pm 0.61$
EC (ds/m)	$0.34^{a} \pm 0.08$	$0.24^{a} \pm 0.04$	$0.12^{a} \pm 0.01$	$0.13^{a} \pm 0.00$
Organic Carbon (mg/kg)	$14.77^{a} \pm 2.48$	$14.30^{a} \pm 1.76$	$7.59^{b} \pm 0.10$	$10.37^{a} \pm 0.09$
Total N (g/kg)	$0.77^{a} \pm 0.21$	$0.60^{a} \pm 0.16$	$0.30^{a} \pm 0.02$	$0.32^{a} \pm 0.02$
Available P (mg/kg)	$0.15^{a} \pm 0.03$	$0.14^{a} \pm 0.03$	$0.16^{a} \pm 0.01$	$0.16^{a} \pm 0.01$
K	$6.18^{a} \pm 2.32$	$38.60^{a} \pm 16.73$	$0.32^{a} \pm 0.01$	$0.29^{a} \pm 0.01$
Na (cmol/kg)	$19.23^{a} \pm 8.25$	$16.59^{a} \pm 7.05$	$1.32^{a} \pm 0.01$	$1.20^{b} \pm 0.02$
Ca (cmol/kg)	$1.29^{a} \pm 0.09$	$1.20^{a} \pm 0.03$	$0.39^{a} \pm 0.01$	$0.32^{b} \pm 0.02$
Mg (cmol/kg)	$1.71^{a} \pm 0.42$	$1.60^{a} \pm 0.36$	$0.88^{b} \pm 0.03$	$1.17^{a} \pm 0.07$
ECE	$18.35^{a} \pm 6.75$	$16.16^{a} \pm 5.86$	$3.48^{a} \pm 0.1$	$4.44^{b} \pm 0.04$

Values are mean $\pm$ standard error of six replications.

[a,b,c,] means in a ow with the same superscripts are not significantly different (P>0.05)

The result of the particles size distribution of the soil and chemical properties of the soil of the experimental sites are presented in table 1. The particles size distribution indicates the soils are predominantly sandy, silt, and clay and ranges from 58.2 – 87.88, 7.29 – 10.50% and 2.5 – 15.4% respectively.

The chemical properties of lowland and upland soil are presented in table 1. Generally, the result showed that upland soils were lower in emulsion capacity, organic, carbon, total Nitrogen, potassium, sodium, calcium, magnesium and ECE respectively than lowland soils with respective soil depth (Table 1)

The results in Table 1 indicated the soil analysis of soil samples from the lowland area revealed to be 79.07%, 10.47% and 15.03 percent sand, silt and clay, while at upland area consisted of 88.87, 8.63 and 2.5 percent sand, silt and clay respectively. The soil pH of lowland area was 7.33%, organic carbon 1.87%, total nitrogen 0.07%, and CEC 13.07mc. at upland area soil pH was 7.97%, organic carbon 10.31%, nitrogen 0.13% and CEC 7.4mc. lowland area has significantly higher (p<5%) amount of silt and clay while upland area had significantly higher (p<5%) amount of sand on the other hand, soil pH and % nitrogen was significantly higher at upland area. Organic carbon and CEC were significantly higher at lowland area.

Table 2: Trace Element at Dundaye Lowland and Plant Sciences garden (UDUS) upland areas

	CEO		Cmol/kg			Mg/kg			
Site	**Ca**	**Mg**	**K**	**Na**	**P**	**Cu**	**Fe**	**Zn**	**Pb**
Lowland	0.68[a]	0.43[a]	1.18[a]	0.67[a]	0.89[a]	0.37[a]	1.56[a]	0.23[a]	0
Upland	0.37[b]	0.22[b]	0.71[b]	0.25[b]	0.48[b]	0.24[b]	1.11[a]	0.20[a]	0
S. E±	0.07	0.05	0.11	0.1	0.09	0.05	0.23	0.04	0
Sign	*	*	*	*	*	*	NS	*	

Means followed by the same letter are not significantly different at 0.05%
NS = Not Significant * = Significant

The results of mineral elements of lowland area (Table 2) indicated the Ca have 0.68Cmol/kg, P 0.89mg/kg , K 1.18Cmol/kg, Mg 0.43Cmol/kg, Na 0.67Cmol/kg, fe 1.56mg/kg, Cu 0.37mg/kg, Zn 0.23mg/kg, and Pb 0.48mg/kg, while upland area had Ca 0.37C mol/kg, P 0.48mg/kg K 0.71Cmol/kg, Mg 0.22C mol/kg, Na 0.25C mol/kg, fe1.11mg/kg, Cu 0.24mg/kg, Zn 0.2mg/kg and Pb 0.00mg/kg. significant difference exist between lowland and upland area. All the mineral elements were significantly higher (p<5%) in lowland area.

Seedling Emergence

The results of lowland indicated in Table 3had shown that, 5 seedlings emerged on 6 day and increased to 16 on the 7 days. This continued to 22, 25, 31, 32, 33, 34 and 36 on the 8, 9, 10, 11, 12, 13, 15 and 16 days respectively where the study was terminated. On the other hand, upland

area has shown that 15, 17 and 18 seedlings emerged on the 6, 7 and 8 days and increased to 21, 29, 10, 31 and 33 on the 9, 10, 11, 12, 13, 14, 15 and 16 days. Upland area had significantly higher on the 6 day, while lowland area had significantly higher on the 8, 9, 12, 13, 14, 15 and 16 days after sowing.

Table 3: Mean seedling emergence of *Argemone mexicana* L (15cm2) over time (days) at Dundaye Lowland and plant Science garden (UDUS) upland area

	Time/Days											
Site	**1-5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Lowland	-	5^{b}	16^{a}	22^{a}	31^{a}	32^{a}	33^{a}	34^{a}	36^{a}	36^{a}	36^{a}	36^{a}
Upland	-	15^{a}	17^{a}	18^{b}	21^{b}	29^{a}	30^{a}	30^{b}	31^{b}	33^{a}	33^{a}	33^{a}
SE±	-	1.02	1.50	1.64	1.80	1.91	1.31	1.60	0.56	1.33	1.33	1.33
Sign		*	*	*	*	NS	NS	*	*	*	*	*

Means follow by same latter are not significantly different at 0.05%
NS= Not Significant *= Significance

Plant Height

The results in Table 4 indicated the shoot height of *Argemone Mexicana L* was 12.56cm, 15.41cm, 16.41cm and 17.63cm at 6, 8, 10 and 12 week. It then increased at 14, 16, 18 and 20 weeks for 18.9cm, 20.39cm, 22.02cm and 24.47cm respectively. While at upland area shoot height was 6.38cm, 9.22cm, 9.95cm and 10.78cm at 6, 8, 10, 12 and 14 week respectively.

Table 4: Growth and yield parameters of *Argemone mexicana* L at Dundaye lowland and Plant Sciences garden (UDUS) upland areas

Time (Wk)	Site	Mean Plant Height (cm)	Mean Leaf Number	Mean Leaf length (cm)	Mean leaf Width(cm)	Mean Stem Diameter(cm)
6	Lowland	12.58 ± 1.98^{a}	11.25 ± 2.10^{a}	9.81 ± 1.26^{a}	4.42 ± 1.00^{a}	0.24 ± 0.02^{a}
	Upland	6.38 ± 0.85^{b}	6.08 ± 0.53^{b}	5.31 ± 0.42^{b}	2.32 ± 0.15^{b}	0.14 ± 0.02^{a}
8	Lowland	15.41 ± 2.68^{a}	15.75 ± 3.99^{a}	10.27 ± 1.30^{a}	5.49 ± 0.99^{a}	0.54 ± 0.09^{a}
	Upland	9.22 ± 1.48^{b}	7.42 ± 0.25^{b}	7.63 ± 0.78^{a}	3.27 ± 0.31^{b}	0.36 ± 0.04^{a}
10	Lowland	16.41 ± 2.72^{a}	18.17 ± 4.09^{a}	11.25 ± 1.58^{a}	6.14 ± 1.05^{a}	0.82 ± 0.11^{a}
	Upland	9.95 ± 2.14^{b}	9.25 ± 0.45^{b}	8.27 ± 1.82^{a}	3.60 ± 0.26^{b}	0.52 ± 0.07^{b}
12	Lowland	17.63 ± 2.79^{a}	20.8 ± 34.19^{a}	12.51 ± 1.58^{a}	7.44 ± 1.14^{a}	1.10 ± 0.19^{a}
	Upland	10.49 ± 3.01^{a}	10.08 ± 2.05^{b}	7.43 ± 2.49^{a}	3.24 ± 1.11^{b}	0.53 ± 0.18^{b}
14	Lowland	18.9 ± 52.92^{a}	23.83 ± 4.09^{a}	13.53 ± 1.62^{a}	8.47 ± 1.24^{a}	1.39 ± 0.27^{a}
	Upland	10.78 ± 3.84^{b}	10.41 ± 3.48^{b}	8.16 ± 2.72^{a}	3.59 ± 1.25^{b}	0.69 ± 0.23^{b}
16	Lowland	20.39±3.24	25.58±4.16	14.66±1.76	9.58±1.30	1.74±0.29
18	Lowland	22.02±3.74	28.16±3.92	15.72±1.75	10.53±1.31	2.09±0.32
20	Lowland	24.47±4.15	30.67±4.02	16.76±1.70	11.78±1.31	2.43±0.33

Means follow by same latter are not significantly different at 0.05%
NS= Not Significant *=Significance

Number of Leaves per Plant

Leaf number at lowland area was 11.25cm, 15.75cm, 18.17cm and 20.8cm at 6, 8, 10 and 12 weeks, which then increased to 23.83cm, 25.58cm, 28.16cm and 30.67cm at 14, 16, 18 and 20 week. Whereas at upland area leaf number was 6.08cm, 7.42cm, 9.25cm, 10.41cm at 6, 8, 10, 12 and 14 week respectively (Table 4).

Leaf length

In figure 5, leaf length of the plant species was 9.81cm, 1027cm, 11.25cm, 12.51cm, 13.53cm, 14.66cm, 15.72cm and 16.76cm at 6 to 20 weeks. While at upland area it was 5.31cm, 7.63cm, 8.27cm, 7.43cm and 8.16cm at 6, 8, 10, 12 and 14 weeks respectively.

Leaf Width

Leaf width of *Argemone maxicana L.* at lowland area indicated that at 6, 8, 10, 12 and 14 week was 4.42cm, 5.49cm, 6.14cm, 7.44cm and 8.47cm respectively. It then rose to 9.58cm, 10.53cm and 11.78cm at 16, 18 and 20 week. At upland area leaf width was 2.32cm, 3.27cm, 3.60cm, 3.24cm and 3.59cm at 6, 8, 10, 12 and 14 week (Table 4).

At 16-week *Argemone mexicana L.* wilted and dried up at upland area, while at lowland area, there was continued increase in all the growth parameters at 16, 18 and 20 weeks at which the study was terminated.

Stem Diameter Girth

The stem diameter girth of *Argemone Mexicana L* was 0.24cm at 6 week while it was 0.54cm, 0.82cm, 1.10cm and 1.39cm respectively at 8, 10, 12 and 14 week; it then increases to 1.74cm, 2.09cm and 2.43cm at 16, 18 and 20 week. On the other hand, the stem girth at upland area was 0.14cm, 0.36cm, 0.52cm, 0.53cm and 0.69cm at 6, 8, 10 12 and 14 week respectively (Table 4).

Discussion

Generally, the result of the soil analysis showed that the soil of lowland area was loamy sand and upland area was sandy. Similarly, upland soils were lower in emulsion capacity organic carbon, total nitrogen, potassium, sodium, calcium, magnesium and CEC respectively than lowland soils with respect to soil depth. The higher content of these minerals in the lowland soils compared to upland soil accounts for the higher growth performance of *A. Mazicana* in lowland areas. Chude *et al.,* (2011) had reported that *A. Mazicanana* can grow in a wide range of soils; on degraded, sandy and even saline soil with low nutrient content. Nevertheless, clay soils are unsuitable for the plant if water logging or saturation occur due to the climatic conditions. It is clear that *A. Mazicana* respond highly when growing on well generated soil. Sandy to loamy soils seems to be a best fit. Optimal pH reaction is considered between 6 and 8.5.

Soil in higher organic matter is generally higher in nitrogen which is due to higher density of the plant species Fickbohm and Zhu (2006), Nitrogen (N) is a key element in plant growth. It is found in all plant cells, in plant protein, hormones and chlorophyll. CEC at lowland area

was higher than upland area, this may be as a result of higher clay and litter decomposition of plant species over time Fickbohm and Zhu (2006).

All the mineral element ca, Na, P, K, Mg, fe, Cu and Zn in the soil at lowland area were higher than upland area. This may be attributed to the litter decomposition of the plant species Chude *et al.,* (2011)

The result further revealed that, seedlings emergence started on the 6th Day after Sowing (DAS) at but lowland and upland area. This was in line with Chude *et al.,* (2011) who stated that "Some seeds are capable of germinating soon after fertilization and long before their normal harvesting time while others may be dormant and require an extended period of rest for only a few days or several years.

Generally, the number of seedlings that emerged at lowland area was significantly higher than upland area. This was possibly than upland area.

Results of growth parameters showed that, the mean girth, mean shoot height, mean leaf number, mean leaf length and mean leaf width of *Argemone mexicana L.* was significantly higher in lowland area than upland area from 6th to 14th weeks growth period from 16th to 20th weeks, the plants at upland area withered and dried. Probably due to depletion of moist we, also according to Hussain *et al.,* (1992) as crops draw water from the soil, it becomes increasingly difficult for them to use water that is left. If no water is added to the soil, at some point plants will not be able to extract enough moisture to meet their requirements, consequently they begin to wilt at which moisture is no longer available to plants. Whereas in lowland area the plant continues to grow well and flourished up to 20th week when the study was terminated. This was attributed to higher moisture content, mineral elements and CEC influence the growth of plants, due to availability of adequate moisture and nutrients in the lowland soils, which enabled roots to absorb enough nutrients for plant growth. This observation is in line with the report of Hussain *et al.,* (1992). According to him adequate moisture aids nutrient absorption to result in good growth response.

Conclusion

Conclusively, it was found out that, the soil of lowland area was loamy sandy, upland area was sandy and pH was generally slightly alkaline. Significantly higher organic carbon and CEC in terms of mineral elements, the plant at lowland area had more calcium, phosphorous, sodium, potassium, magnesium, iron, copper and zinc and lead was found to be absent in the study area. It was observed that *Argemone maxicana L.* at lowland area grew more in height, leaf number, leaf length, girth and leaf width than upland area during 12th – 20th week growth period. This research finding recommended that: *Argemone mexicana L.* should be cultivated at lowland area for optimum emergence, growth and yield in the study area.

REFERENCES

Abdullahi, A. A; B. L. Aliero, & A.A. Aliero, (2017). Breaking of seed Dormancy, Germination and Seedling Growth of Anacardium Occidentale L. *International Journal of Innovative Biosciences Research*.5(1);15 – 21.

Chude, V.O., Olayiwola, S.O., Osho, A.O. And Daudu, C.K. (2011), Fertilizer use and management practices for crop in Nigeria. 46h Edition, Federal fertilizer department, Federal Ministry of Agriculture Rural Development, Abuja, Nigeria Pp. 215.

CSIRO, (1990), Weed management report of research (1997 – 1999) CSIRO Entomology www.ento.csiro.qulreseach/weedmgt/pdt/ror-weeds.pdf.

Fickbohm, S.S. & Zhu, W.X. (2006) Exotic purple loosestrice invasion at native cattail freshwater wetlands. Effect on organic matter distribution and soil nitrogen cycling. App soil ecology. 33:123 – 131.

Heneghan, L., Fatemi, F., Umek, L., Grady, K. Fagen, K. & Workman, M. (2006). The invasive shrub European buckthorn (*Rhamnus catharica L*) alters soil properties in Midwestern US wood-lands. Applied soil Ecology. 32: 142 – 148.

Hussaini, H.M; Chaudry, M.S; Malik,S'M; & Nasir, M.{1992}. Proceedings of 33rd Symposium. Soil Science Society of Pakistan.pp 91-120.

Karikan, S.K., Bagai, C. & Segulagwe, A. (2000) Allelopathic activity of five Botswana weed species on Bambara groundnut [*Vigna subterranean (L.) verde]*and sorghum [*sorghum bicolar (L.) moench] crop Research Journal*. 20(3): 397 – 406; 25 ref.

Nigeria Metrological Agency (2024). Metrological Data Report. Sultan Abubakar III International Airport Sokoto. 1-2 www.nimet.gov.ng.

Saggar, S., Mclintosh, P, Hedley, C. & Knicleer, H. (1999). Changes in soil microbial biomass, metabolic quotient and organic matter turnover under *Hieracium pilosella L.* Biological fertility of soils. 30: 232 – 238.

Singh, S.J. Singh, T.D., Singh, V.P, & Pandey, V.B. (February, 2010). Quaternary Alkaloids at *Argemone mexicana L.* pharmaceutical Biology. 48(2): 15.

SPSS for window (2016). Statistical package for social sciences (S.P.S.S.) of releases 20.0 the Apasche Software Foundation.