©NIJSES Publications

Open Access

NEWPORT INTERNATIONAL JOURNAL OF SCIENTIFIC AND EXPERIMENTAL SCIENCES (NIJSES)

Volume 3 Issue 1 2023

Allelopathetic Effects of some species of Asteraceae (*Vernonia cinerea* L., *Emilia sonchifolia* L. and *Ageratum conyzoides* L.) on the neighbouring weeds during growth

Kenneth Udeh Ekwealor[1], Alexander Ikechukwu Izundu[2] and Maureen Obianuju Chukwuma[3]

[1,2,3]Department of Botany, Faculty of Biosciences, Nnamdi Azikiwe University, Awka, Nigeria.

[1]E-mail: kenekwealor@gmail.com; Phone: +2348038724123

[2]E-mail: izundualexanderik@yahoo.com; Phone: +2347036643123

[3]E-mail: ujmeche@gmail.com Phone: +2348030905566

ABSTRACT

Recently, there are scanty of reports of some members of Asteraceae that produce substances that inhibit the germination and growth of crops and weeds. This research is therefore aimed at ascertaining the possible allelopathetic effects of some species of Asteraceae (*Vernonia cinerea* L., *Emilia sonchifolia* L. and *Ageratum conyzoides* L.) on the neighbouring weeds during growth. The objectives of the studies were to evaluate the phytochemical constituents of the selected plant species, ascertain the effects of the phytochemical constituents of the selected weeds on the neighbouring weeds during growth**.** Water extract of the shoot and root of each species where obtained and used to check the effects on the nighbouring weeds of the selected weeds during growth. The data obtained were analysed using computer moderated Duncan multiple range test (DMRT). The result showed that many different phytochemical substances were detected in the plant at different concentrations including alkaloids, saponins, tanins, flavonoids, phenols, steroids and hydrogen cyanids. The result further revealed the neigbouring plant species of the selected weeds species. *Emilia sonchifolia* lead the highest companion plant made up of eight of the nineteen associate plant representing 42.11% while *Vernonia cinerea* had the least companions numbering two and being equivalent to 18.53%. *A. conyzoides Chromolaena odorata*, and *E. sonchifolia* were the most common companion plant associated with the alleloplants as each was seen the three test alleloplants. On the other hand, *Talinum triangulare*, *Boerhavia diffusa* and *Commelina diffusa* were particularly present as companions of *Ageratum conyzoides* but were not found in association with other alleloplants. Also *Triumfetta rhomboidea*, *Andropogon gayanus*, *Oldenlandia herbacea and the Andropogon tectroum* were perculiar to *Vernonia cinera* as companion plants while other alleloplants like *Perotis indica*, *Euphorbia hyssopifolia*, *Euphorbia heterophylla*, *Spigela anthelmia and Gomphrena celosioides* were found to be selectively associated with *E. sonchofilia* but were not in company of the other alleloplants. Based on the findings, it was observed that the selected weeds contain many different phytochemicals habouring numerous active principles within them. These released plant exudates exhibit influence on the surrounding plant flora both positively and negatively. Again, whereas many plants are negatively affected (weed control potentials) a few companion plant appeared to benefit

from the allelopathic plant surroundings. The potential weed control activity of the allelopathic plants was therefore established.
Keywords: allelopathetic effect, growth, neighbouring weeds, Asteraceae, *Vernonia cinerea* L., *Emilia sonchifolia* L., *Ageratum conyzoides*

INTRODUCTION

Asteraceae is one of the two largest families of flowering plants, with certainly more than 15,000 species. The only other family of comparable size is the orchidaceae. The Asteraceae is cosmopolitan in distribution, but partial to open or semi open habitats rather than deep woods. In most parts of the temperate zone, including our region, they are by far the largest family. Many genera and species are cultivated for ornament. The flower heads vary from small to large, and are often brightly colored. The number of flowers in a head is seldom less than 5, and ranges upward into the hundreds or even more than a thousand, as in the common cultivated sunflower. A few species have only a single flower in each head. *Echinops* and some other genera are one-flowered, individually involucrate heads aggregated into a secondary head with a secondary involucre. Compound heads with more than one flower in each individual head also occur in some genera, such as *Elephantopus.*

In the Asteraceae, it has been observed that some plants species like *Tragopogon dubius*, *Tripleurospermum perforate*, *Chamomilla inodora*, *Matricaria inodora*, *Tripleurospermum inodorum etc.*, inhibit growth and recruitment of weed, forbs and grasses [1]. This phenomenon is known as allelopathy (from the Greek allelon = of each other, pathos = to suffer). Allelopathy is an interference mechanism, in which plants produce and release defensive metabolites (i.e., allelochemicals), exerting a negative effect on conspecific and heterospecific plants [2]. It refers to the direct or indirect chemical effects of one plant on the germination, growth, or development of neighboring plant. This implies that some weeds species have the capacity to inhibit the seed germination and growth of other neighboring plant species in their immediate surrounding. Hence some plant species exude useful phytochemicals that inhibit/suppress seed germination and weed growth [3]; [4]. These phytochemicals are generally phenolics (such as tannins), alkaloids, steroids, terpenes, saponins, and quinones that affect the growth and development of certain plant species [5]. These phytochemicals affected many cellular processes in target plant species, including disruption of membrane permeability [6], ion uptake [7], inhibition of electron transport in both photosynthesis and the respiratory chain [8]; [9]; [10], cause damage to DNA and protein, alterations of some enzymatic activities [11] and [12] and ultimately lead to programmed cell death [2]. Many weeds hamper the growth of crops and natural vegetation as allelopathic plants [13]; [14]. The effects of one plant on another plant due to released compounds may be both stimulatory and inhibitory. Hence a number of weed and crop species have been reported to possess allelopathic effects [15]. The non-protein amino acid is responsible for allelopathic action, through m-tyrosine, fescue grasses interfere with root development of other plants, subsequently displacing neighboring plants [16] Allelopathic plant governs various ecological processes such as productivity and vegetation patterning and also it is an important potential source for alternative agrochemicals, pharmaceuticals and biological control agents [17]. Apart from these general phytochemical substances, there are specific qualities of each weed.

Ageratum conyzoides is an annual erect, branched herb growing 15 to 100 cm tall. Its stem is covered with fine White hairs, leaves are opposite, pubescent with long petioles and include glandular trichomes. It has a shallow tape roof system. The inflorescence contains 30 to 50 pink or purple flowers arranged a corymb and are self-incompatible. The fruit is an achene with an aristate pappus and is easily dispersed by wind and animals' fir. Seeds are positively photoblastic and remain viable up to 12 months. The seeds germinate between 20-25°C. It prefers a moist, well-drained soil but may tolerate dry conditions. *A. conyzoides* contains many metabolites: Flavonoids, chromenes, benzo Furans and terpenoids [9] and some of these phytochemical substances released by the plant are inhibitory to other organisms. *Emilia sonchifolia* (L) Dc Family (Asteraceae), commonly known as lilac tasse flower' is an annual herb with erect or prostrate at base and up to 10-150 cm tall. It often branches from the very base, usually purplish-green and deep rooting. The leaves (4-16 cm and 1-8 cm) are sessile, with alternate arrangement dark green above and lighter green or tinged with purple beneath, and more or less irregularly coarsely dentate. The inflorescence is a terminal head and few together in slender corymbs or rarely solitary. The flowers are orange, pink, purple and white in colour. The fruit is one seeded (2.5-3.0 mm), linear oblongoid, soft and brown in colour. The plant occurs frequently as a weed in grassy fields, road sides or in croppy fields and teak forest, ascending up to 1,350m in the hills [18].

Vernonia cinerea (Linn) is an erect, tall, pubescent striate stem with few branches; alternate leaves of variable shapes, ovate-laneolate, narrowed at base, entire or shallowly create or serrate, acute shortly micronate, pubescent; Fls and Fots in July to March, Heads in lax divaricated terminal lorymbos cymes, peduncles with small brait beneath the head; Receptacles convex, naked or with few bristles; involucral bract many seriate, green, the outer ones shorter,

ovate, pubescent, the inner ones linear-lanceolate, awned, silky on the back. All florets have pink-purple, tubular, 5-lobed, 1-2 mm in long corollas. Anthers erect with obtuse bases. Style arms subulate. Achenes are 1.5-2 mm in length, obovate oblong, and hairy pappus bristles in two series, the outer ones shorter than the inner. It is a common weed in gardens, agricultural fields and grasslands; in waste lands; an old walls and barren areas. Consequently, it has been observed that phytochemicals to an extent may have an either inhibitory or stimulatory effect on the germination and growth of subsequent crops or weeds. The literature on the interactional effect of phytochemicals on the germination and growth of crops or weeds is quite scanty. It is against this background therefore, the present study was undertaken with the following objectives: (i) To determine the phytochemical constituents of *Ageratum conyzoide*, *Emilia sonchifolia*, and *Vernonia cinerea* (ii) To investigate the possible effects of phytochemicals of the selected plant species on the neighbouring weeds during growth.

Materials and Methods

Weed Collection: The selected insect-free, diseases-free weeds were collected in an abandoned farmland within the Nnamdi Azikiwe University, Awka campus of Anambra state, Nigeria. The authentication of the weeds was done by the university curator. They included *Emilia sonchifolia*, *Vernonia cinerea*, *and Ageratum conyzoide*. To lose the soil around the plants, the environment were the weeds were found was watered before uprooting. The whole weeds were carefully dug up using a digging fork. The plant shoots were separated from the root with a knife and both sections were spread out on a laboratory beach for 48 hours to wither slightly. The collected weeds were washed with running tap water, air dried, homogenized to a fine powder and stored in air tight bottles at 4°C prior to use.

Preparation of Extracts

Water Extracts: The shoots and roots of each weed species were separately cut with a knife into very tiny bits and dried at room temperature. The dry shoot of each plant was ground into powder using a laboratory mill. Precisely 100 grams of each powdered sample was weighed using a beam weighing balance. The weighed sample was soaked in 200 mls of distilled water contained in a conical flask and swirled. After 48hours, with interval stirring, the mixture was filtered using Whatman No.1 filter paper into a clean beaker and concentrated to dryness using a water bath at 70° C. Prior to laboratory experiment, the extracts obtained were filtered with a membrane filter of pore size 0.45 ul to obtain a sterile extract and stored in an air-tight bottle at 4°C for use. The filtrate was designated as stock solution of 100% concentration following the standard methods [19].

Determination of Neighbouring Weeds of the Selected Weeds Species

The matured weeds of the selected weeds that was collected from an abounded farmland within the university community their seeds were harvested, dried at room temperature and stored in airtight container for further use. An abounded farmland measured 10 m by 10 m was mapped out, cleared and tilled manually. The plot map out was divided into three (3) sections and each section was tagged for each weed. It was randomly balloted and the positions were picked. The seeds of the four seeds of each weed were broadcasted. Light soil were used to cover the seeds to avoid movement so that the ones in each section would stay there and germinate. The seeds germinated and grew. Eventually weeds started come up. The selected weeds were allowed to fully grown alongside with other weeds (neighbouring weeds) that visibly resist their phytochemicals exudation. The growth lasted until the neighbouring weeds started bearing flowers for its identifications. The neighbouring weeds were collected and identified using the service of the university curator.

Quantitative Assay of the Phytochemical Constituents

The quantitative analysis of the bioactive chemical constituents of the selected allelopathic plants (*E. sonchifolia*, *V. cinerea*, and *A. conyzoides*) under study were carried out using the following experimental standard procedure [20];**Alkaloids:** The alkali precipitate gravimetric method was used. A weighed sample (5 g) was weighed into a 250 ml beaker and 200 ml of 10% acetic acid in ethanol was added. Beaker was covered and allowed to stand for 4 h. Then it was filtered and the extract was concentrated on a water bath to one quarter of its original volume. Concentrated ammonium hydroxide was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to stand till its settlement. The precipitate was easily collected from the solution by filtration with a weighed filter paper and was washed with dilute ammonium hydroxide. The residue was the alkaloid precipitate which was weighed after complete dryness and the percentage was calculated. The test was repeated for all samples.

$$\%\ Alkaloid = \frac{W2 - W1}{W} \times 100$$

Saponins: Saponin was determined by the double solvent extraction gravimetric method. Five grams (5 g) of each sample was mixed with 50 mL of 20 % aqueous ethanol solution and incubated for 12 hours at a temperature of 55°C with constant agitation. After that, the mixture was filtered through Whatman No. 42 grade of filter paper. The

residue was re extracted with 50 ml of the ethanol solution for 30 minutes and the extracts weighed together. The combined extract was reduced to about 40ml by evaporation and then transferred to a separating funnel and equal volume (40 ml) of diethyl ether was added to it. After mixing well, there was a partition and the upper layer was discarded while the aqueous layer was reserved. This aqueous layer was re-extracted with the ether after which its pH was reduced to 4.5 with drop-wise addition of dilute NaOH solution. Saponin in the extract was taken up in successive extraction with 60 ml and 30 ml portion of normal Butanol. The combined extract (ppt) was washed with 5 % NaCl solution and evaporated to dry ness in a previously weighed evaporating dish. The saponin was then dried in the oven at 60°C (to remove any residual solvent) cooled in a desiccator and re-weighed. The saponin was determined and calculated as a percentage of the original samples.

$$\%\ saponin = \frac{W_2 - W_1}{W_1} \times \frac{100}{1}$$

Flavonoids: Flavonoid was determined using the method described by [20]. A measured weight of each processed sample (5 g) was boiled in100mls of 2 M HCl solution under reflux for 40mins. It was allowed to cool before filtering. The filtrate was treated with equal volume of ethyl acetate and the mixture was transferred to a separation funnel. The flavonoid extract (contained in the ethyl acetate portion) was recovered by filtration using weighed filter paper. The weight was obtained after drying in the oven and cooling in desiccators. The weight was expressed as a percentage of the weight of sample analyzed. It was calculated using equation;

$$\%Flavonoid = \frac{W_2 - W_1}{Wt\ of\ the\ sample} \times \frac{100}{1}$$

Tannins: This was determined by Folin-Denis colometric method. Five grams (5 g) of each leaf sample was put inside a volumetric flask and 50 ml of distilled water was dispensed into the volumetric flask. The mixture was shaken for 30 minutes at room temperature and filtered to obtain the extract. A standard tannic acid solution was prepared, 2 ml of the standard solution and equal volume of distilled water were dispensed into a separate 50 ml volumetric flask to serve as standard and reagent blank respectively. Then 2 ml of each of the sample extracts was put in the respective labeled flask. The content of each flask was mixed with 35 ml distilled water and 1ml of the Folin-Denis reagent was added to each. This was followed by 2.5 ml of saturated Na_2CO_3 solution. Therefore, each flask was diluted to the 50 ml mark with distilled water. The absorbance of each sample was measured at 760 nm in a spectrophotometer with the reagent blank at zero. The tannin content was calculated using equation;

$$\%\ Tannin = \frac{100 \times a_u \times C \times V_t}{W \times a_s \times V_a}$$

Phenols: The total phenols were determined using the Foli -Ciocalteau spectrophotometric method. Exactly 0.2 g, (200 mg) of each leaf sample was extracted with 10mL pure methanol. The extract (filtrate) was used. An aliqoute, 2 mL of the extract was measured into a clean dry 50mL volume flask and treated with 1mL Folin - Ciocalteau reagent. Meanwhile, a standard phenol solution was prepared and 1mL of it was treated with the F-C reagent in a separate 50mL flask. Then 2 ml of saturated sodium carbonate solution was added into each of the flasks, mixed well and allowed to incubate in the dark at room temperature for 90 minutes. Thereafter the content of each flask was made up to the 50 mL mark with methanol and the absorbance was read in a spectrophotometer with methanol blank at zero and at a wavelength of 510 nm. The Phenol content was calculated using the formula below:

$$\%\ Phenol = \frac{100 \times a_u \times C \times V_t \times D}{W \times a_s \times 1000 \times V_a}$$

Steroids: The gravimetric method of Osuagwu and Ihenwosu (2014) [20] was applied; Exactly 5 g of the processed sample was hydrolyzed by boiling in 1M HCl solution (50 mL for 30 minutes). It was allowed to cool and then filtered, the filtrate was treated with equal volume of ethyl acetate and transferred to a separating funnel, after partitioning, the aqueous layer was discarded while the ethyl acetate layer was recovered and kept at 100 °C in a water bath (to evaporate it) and acetyl alcohol was added to it to extract the steroid and then heated in a water bath until turbidity is observed. It was allowed to cool and the precipitate was recovered by filtration using a weighed filter paper, the residue was dried in the oven, cooled in a desiccator and reweighed. The formula below was used:

$$\%\ Steroid\ = \frac{W_2 - W_1}{W} \times 100$$

Hydrogen Cyanogenic Glycoside (HCN): This was determined using the alkaline picrate colorimetric method. A unit weight, 1 g of each sample was soaked in 150 ml of distilled water in a conical flask over the mixture in the flask. Care was taken to ensure that the paper did not touch the surface of the liquid in the flask. Meanwhile 1 ml of standard Cyanide solution was mixed with 150 ml distilled water in a separate flask and treated the same way as the sample. The flasks were incubated overnight (18 hours) at room temperature. The next day, the alkaline picrate paper was removed and elated in 60 ml distilled water. The obsorbances were read at 540 mm in a spectrophotometer, both the sample and the standard solution. The formular below was used for calculation:

$$\text{HCN (Ng/kg)} = \frac{1000}{w} \quad x \quad \frac{au}{as} \quad x \quad c$$

Statistical Analysis: The data obtained were analysed using computer moderated SPSS Duncan's Multiple Range Test (DMRT) SPPS programme at 5 % level of probability.

RESULTS

Result of the phytochemical composition of the selected weeds in Table 1 showed significant variations in the concentration of the many diverse phytochemicals found in the plants. From the result, many different phytochemicals groups were detected in the plant at different concentrations including alkaloids, saponins, tanins, flavonoids, phenols, steroids and hydrogen cyanids. Alkaloids was in concentration ranging from 1.63 % in *Vernonia* to 0.37 % in *Emilia sonchifolia* while saponin content varied between 0.17 % (*Ageratum*) and 0.77 % (*Vernonia*). The concentration of flavonoid was highest (0.82 %) in A*geratum* and lowest (0.44 %) in *E. sonchifolia* whereas Tannin was highest (1.06 %) in *Emilia sonchifolia* and lowest 0.43 % in *Ageratum conyzoides*. Concentration of Phenols in the test plants varied between 0.38 % in *Emilia sonchifolia* and 0.54 % in *A. conyzoides*. While the highest concentration of steroids (0.18 %) was recorded in *E. sonchifolia*, the lowest steroid content (0.15 %) was found in *V. cinerea and A, conyzoides* respectively. Whereas there were no significant differences between the steroid content of *V. cinerea* (0.15 %), *A. conyzoides* (0.15 %), all two varied significantly from *E. sonchifolia* (0.18 %). The concentration of hydrogen cyanide was in the range of 3. 90 µg/kg to 14.51 µg/kg with *V. cinerea* having the highest value while *Ageratum* had the least (Table 1). The concentrations of all other phytochemicals in the different test plants showed variations of significant differences ($p < 0.05$).

Table 1: Phytochemical Composition of the Weeds (percentage composition)

Weeds	Alkaloids	Saponins	Flavanoids	Tanins	Phenoids	Steroids	Hydrogen Cyanids (µg/kg)
Ageratum conyzoides	$0.49^{d} \pm 0.23$	$0.17^{e} \pm 0.01$	$0.82^{a} \pm 0.04$	$0.43^{d} \pm 0.12$	$0.54^{c} \pm 0.12$	$0.15^{a} \pm 0.02$	$3.90^{d} \pm 0.04$
Emila sonchifolia	$0.37^{e} \pm 0.01$	$0.33^{e} \pm 0.02$	$0.44^{cd} \pm 0.01$	$1.06^{a} \pm 0.09$	$0.38^{e} \pm 0.03$	$0.18^{b} \pm 0.01$	$5.97^{c} \pm 0.09$
Vernonia cinerea	$1.62^{a} \pm 0.02$	$0.77^{a} \pm 0.04$	$0.62^{b} \pm 0.04$	$0.54^{c} \pm 0.03$	$0.47^{d} \pm 0.01$	$0.15^{a} \pm 0.02$	$14.51^{b} \pm 0.17$

Values showed means of triplicate analysis ± standard deviation. Figures with different superscripts in the column are significantly different ($p<0.05$).

Neighbouring Weeds of the Selected Weeds Species During Growth

Result of the neigbouring plant species of the selected weeds species in Table 2 shown that about nineteen different plant were found to grow as neigbouring weeds close to the three selected plants studies. These plants were found

to co-exist with different selected plants suggesting their vegetative affinity to the selected weeds species. From the results, *Emilia sonchifolia* lead the highest companion plant made up of eight of the nineteen associate plant representing 42.11% while *Vernonia cinerea* had the least companions numbering two and being equivalent to 18.53%. *A. conyzoides Chromolaena odorata*, and *E. sonchifolia* were the most common companion plant associated with the alleloplants as each was seen the three test alleloplants. On the other hand, *Talinum triangulare*, *Boerhavia diffusa* and *Commelina diffusa* were particularly present as companions of *Ageratum conyzoides* but were not found in association with other alleloplants. Also *Triumfetta rhomboidea*, *Andropogon gayanus*, *Oldenlandia herbacea and the Andropogon tectroum* were perculiar to *Vernonia cinera* as companion plants while other alleloplants like *Perotis indica*, *Euphorbia hyssopifolia*, *Euphorbia heterophylla*, *Spigela anthelmia and Gomphrena celosioides* were found to be selectively associated with *E. sonchofilia* but were not in company of the other alleloplants. Generally, therefore, the presence of these peculiar plants in the company of the different test alleloplants suggests a type of affinity of these plants to the plant which act as alleloplants. This affiliation may not be unconnected with exudates from the alleloplant which attract or encourage these companion plants to thrive well beside the alleloplants irrespective of location (Table 2).

Table 2: Neighbouring Weeds of the Selected Weeds Species During Growth

Neighbouring Weeds	*Ageratum Conyzoides*	*Emilia sonchifolia*	*Vernonia Cinerea*
Triumfetta rhomboidea	-	-	+
Ageratum conyzoides	+	+	+
Emilia sonchifolia	+	+	+
Andropogon tectroum	-	-	+
Tridax procumbens	+	+	+
Axonopus compressus	+	+	-
Chromolaena odorata	+	+	+
Oldenlandia herbacea	+	-	-
Perotis indica	-	+	-
Euphorbia hyssopifolia	-	+	-
Euphorbia heterophylla	-	+	-
Spigela anthelmia	-	+	-
Gomphrena celosioides	-	+	-
Talinum triangulare	+	-	-
Commelina diffusa	+	-	-
Boerhavia diffusa	+	-	-
Andropogon gayanus	-	-	+

Values of negative signs (-) indicate weeds that was not found growing around the selected plant under study while values with positive signs (+) showed weeds that was found growing around the selected weed at the time of the study.

DISCUSSION

Result of the phytochemical composition of the selected weeds in Table 1 showed significant variations in the concentration of the many diverse phytochemicals found in the plants. From the result, many different phytochemicals groups were detected in the plant at different concentrations including alkaloids, saponins, tanins, flavonoids, phenols, steroids and hydrogen cyanids. Thus the presence of many different phytochemicals in the allelopathic plants is an indication of high potentials of medicinal value which places them well for activity as whole plant weed control agents [20-32]. Most of the phytochemicals found in the plants are associated with potency against microorganism [22-32]. Early studies show that the efficiency of plants of use as potent agents is a function of their phytochemical concentrations (Sofowara, 1993)[21]. Some chemical substances found in plants like alkaloids, are associated with toxicity and are able to cause physiological changes in living things [22]. Alkaloids are also reported to be one of the basic raw materials for the manufacturing of noval drugs and chemicals (Osuagwu and Ihenwosu, 2014)[20]. *A. conyzoides* contains many metabolites: Flavonoids, chromenes, benzo Furans and terpenoids (Ming, 1999) and some of them are inhibitory to other plant. These finding is in correlation with (Rizvi, 1999) [23] allelopathic plants contain different classes of phytochemicals like phenolic compounds, flavonoids, terpenoids, alkaloids, steroids, carbohydrates, and amino acids.

In Table 2 Result showed the plants that coexist with the selected plant species. About seventeen different plant were found to grow as neigbour to the three selected plants studies. These plants were found to co-exist with the different selected plants suggesting their vegetative affinity to the alleloplants. Therefore, the presence of these peculiar plants in the company of the different test alleloplants suggests a type of affinity of these plants to the plant which act as alleloplants. This affiliation may not be unconnected with exudates from the alleloplant which attract or encourage these companion plants to thrive well beside the alleloplants irrespective of location. The absent of certain weeds suggest the allelopathic properties of the test plant. This finding is line with [22]; [14] many weeds hamper the growth of crops and natural vegetation as allelopathic plants. Hence a number of weed and crop species have been reported to possess allelopathic effects [15]. The non-protein amino acid is responsible for allelopathic action, through m-tyrosine, fescue grasses interfere with root development of other plants, subsequently displacing neighboring plants [16]. Also, the consistency and repeated presence of some companion plants suggests an association with the allelopathic plants, with possible symbiotic relationship, which benefits the plants. The general thinking is suggestive of the ability of these plants, though their chemical contents and exudates to act as a biological control agent against some weeds and allowing only those with possible affiliation through symbiosis to thrive. Thus, allelopathic plant governs various ecological processes such as productivity and vegetation patterning and also it is an important potential source for alternative agrochemicals, pharmaceuticals and biological control agents [17].

Conclusion: Based on the findings recorded in this work, it was observed that the selected weeds contain many different phytochemicals habouring numerous active principles within them. These released plant exudates exhibit influence on the surrounding plant flora both positively and negatively. Again, whereas many plants are negatively affected (weed control potentials) a few companion plant appeared to benefit from the allelopathic plant surroundings. The potential weed control activity of the allelopathic plants was therefore established.

Recommendations: Based on the findings recommendations was made: Natural herbicides, insecticides, and other pesticides, should be use to manage weeds and other agricultural practices since it helps to reduce environment/soil pollution and diminish autotoxicity hazards.

REFERENCES

1. Mushtaq, M.N.; Cheema, Z. A.; and Bazmi, S.A. (2003). Allelopathic effects of sunflower aqueous extracts on germination of wheat and some important wheat weeds. *Pakistan. Journal of Science Resources, 55:* 71-75.
2. Swanson, N.L.; Leu, A.; Abrahamson, J.; and Wallet, B. (2014). Genetically engineered crops, glyphosate and the deterioration of health in the United States of America. *Journal Organ System*, 9: 6–37.
3. Baziar, M.R.; Farahvash, F.; Mirshekari, B. and Rashidi, V. (2014). Allelopathic effect of rye grass (Lolium persicum) and wild mustard (*Sinapis arvensis*) on barley. *Pakistan Journal Botany, 46:* 2069–2075.
4. Sitthinoi, P.; Lertmongkol, S.; Chanprasert, W.; and Vajrodaya, S. (2017). Allelopathic effects of jungle rice (Echinochloacolona (L.) Link) extract on seed germination and seedling growth of rice. *Agricultural Natural Resources, 51:* 74–78.

5. Dayan, F.E.; Cantrell, C.L.; and Duke, S.O (2009). Natural products in crop protection. *Bioorganic Medical Chemistry, 17:* 4022–4034
6. Galindo, J.C.C.; Hernandez, A.; Dayan, F.E.; Tellez, M.R.; Macias, F.A.; Paul, R.N.; and Duke, S.O. (1999). Dehydrozaluzanin C, a natural sesquiterpenolide, causes rapid plasma membrane leakage. *Phytochemistry, 52:* 805-813.
7. Lehman, M.E.; and Blum, U. (1999). Evaluation of ferulic acid uptake as a measurement of allelochemical dose: Effective concentration. *Journal Chemical Ecology, 25:* 2585-2600.
8. Abarahim, D.; Braguini, W.L.; Kelmer-Bracht, A.M.; and Ishii-Iwamoto, E.L. (2000). Effect of four monoterpenes on germination, primary root growth, and mitochondrial respiration of maize. *Journal Chemical Ecology, 26:* 611-624.
9. Calera., R., Mata, R., Anaya, A.L., and Lotina-Hennsen, B. (1995). 5-O-B-Dgalactopyranosy 1-7-methoxy-3'4' dihydroxi-4-fenilcumarin, an inhibitor of photophosphorylation in spinach chloroplast. *Photosynthesis Resources, 45:*105-110
10. Penuelas, J.; Ribas-Carbo, M.; and Giles, L., (1996). Effects of allelochemicals on plant respiration and oxygen isotope fraction atom by the alternative oxidase. *Journal Chemical Ecology, 22:* 801-805.
11. Anaya, A.L.; and Pelayo-Benavides, H.R. (1997). Allelopathic potential of Mirabilis jalapa L. (Nyctaginaceae): Effects on germination, growth and cell division of some plants. *Allelopathy Journal, 4:*57-68.
12. Cruz-Ortega, R.; Anaya, A.L.; Hernandez-Bautista, B.E.; and Laguna- Hernandez, G. (1998). Effect of allelochemical stress produced by Sicyos deppei on seedling root ultrastructure of Phaseolus vulgaris and Cucurbita ficifolia. *Journal Chemical Ecology, 24:* 2039-2057.
13. Hussain, F.; Ghulam, S.; Sher, Z.; and Ahmad, B. (2011). Allelopathy by *Lantana camara. Pakistan Journal Botany, 43(5):* 2373-2378.
14. Kato-Noguchi, H.; and Ino, K. (2003). Rice seedlings release momilactone B into the environment. *Phytochemistry, 63:* 551–554.
15. Rice, E.L. (1984). *Allelopathy, 2nd ed.*, Academic Press, Orlando. 457pp.
16. Bertin, C.; Weston, L.A.; Huang, T.; Jander, G.; Owens, T.; Meinwald, J.; and Schroeder, F.C. (2007). Grass roots chemistry: meta-Tyrosine, an herbicidal nonprotein amino acid. *Proceeding Natural Academia Science USA, 104*: 16964–16969
17. Cheema, Z.A.; Khaliq, A.; and Saeed, S. (2004). Weed control in maize (*Zea mays L.*) through sorghum allelopathy. *Journal of Sustainable Agriculture, 23*: 73-86.
18. Khanh, T.D.; Elzaawely, A. A.; Chung, I. M.; Ahn, J.K.; Tawata, S.; and Xuan, T. D. (2007). Role of allelochemical for weed management in rice. *Allelopathy Journal, 19:*85-96
19. Harborne, J. B. (1996). *Phytochemical Analysis: a modern Techniques to Plant Analysis (2nd Edition).* Chapman and Hall, New York. 236pp
20. Osuagwu, G. G. E.; and Ihenwosu, A. O. (2014). Phytochemical composition and actimicrobial activity of the leaves of *Alchornea cordifolia* (Schum and Thonn), *Savagevieva liberica* (Gerand and Labr) and *Uvaria chamae* (P. Beauv). *American Journal of Phytomedicine and clinical Therapentics, 2(1):* 001-012
21. Sofowara, A. E. (1993). *Medicinal Plants and Traditional Medicine in Africa (2nd Edition).* Spectrum Books Ltd, Ibadan. 289pp
22. Harborne, J. B. (2014). *Phytochemical Analysis: a modern Techniques to Plant Analysis (2nd Edition).* Chapman and Hall, New York. 236pp
23. Rizvi, S. J. H.; Tahir, M.; Rizvi, V.; Kohli, R. K.; and Ansari, A. (1999). Allelopathic Interactions in Agroforestry Systems. *Critical Reviews in Plant Sciences, 18:* 773-779.
24. Ugwu Okechukwu PC, FC Nwodo Okwesili, E Joshua Parker, Bawa Abubakar, C Ossai Emmanuel, E Odo Christian (2013). Phytochemical and acute toxicity studies of Moringa oleifera ethanol leaf extract. International Journal of Life Science BiotechNology and Pharma Research 2(2): 66-71.
25. Adonu Cyril C, OPC Ugwu, Ossai Esimone Co, A Bawa, AC Nwaka, CU Okorie (2013). Phytochemical analyses of the menthanol, hot water and n-hexane extracts of the aerial parts of cassytha filiformis (Linn) and leaves of cleistopholis patens. Research Journal of Pharmaceutical, Biological and Chemical Sciences,4: 1143-1149.
26. CE Offor, PC Ugwu Okechukwu, PM Aja and IO Igwenyi (2015). Proximate and phytochemical analyses of Terminalia catappa leaves. European Journal of Applied Sciences,7(1): 09-11.

27. Ilozue NM, UP Ikezu, PC Ugwu Okechukwu (2014). Antimicrobial and phytochemical screening of the seed extracts of Persea americana (avocado pear). IOSR Journal of Pharmacy and Biological Sciences,9(2): 23-25.
28. Igwenyi IO, OE Isiguzo, PM Aja, PC Ugwu Okechukwu, NN Ezeani, AJ Uraku (2015). Proximate composition, mineral content and phytochemical analysis of the African oil bean (Pentaclethra macrophylla) seed. American-Eurasian J Agric Environ Sci, 15: 1873-1875.
29. PM Aja, PCU Okechukwu, K Kennedy, JB Ibere, EU Ekpono (2017). Phytochemical analysis of Senna occidentalis leaves. IDOSR J Appl Sci,2(1): 75-91.
30. Offor CE, JU Agidi, CO Egwu, N Ezeani and PC Ugwu Okechukwu (2015). Vitamin and mineral contents of Gongronema latifolium leaves. World Journal of Medical Sciences,12(2): 189-191.
31. Chukwuemeka IM, IP Udeozo, C Mathew, EE Oraekwute, RC Onyeze and OPC Ugwu. Phytochemical analysis of crude ethanolic leaf extract of Morinda lucida. (2013). Int. J. Res. Rev. Pharm. Appl. Sci, 3 (4): 470-475.
32. Ali Ikechukwu A, UA Ibiam, PC Ugwu Okechukwu, OR Inya-Agha, U Orji Obasi, David Obasi Chukwu (2015). Phytochemistry and acute toxicity study of Bridelia ferruginea extracts. World J. Med. Sci, 12 (4): 397-402.

Kenneth Udeh Ekwealor, Alexander Ikechukwu Izundu and Maureen Obianuju Chukwuma (2023). Allelopathetic Effects of some species of Asteraceae (*Vernonia cinerea* L., *Emilia sonchifolia* L. and *Ageratum conyzoides* L.) on the neighbouring weeds during growth. *NEWPORT INTERNATIONAL JOURNAL OF SCIENTIFIC AND EXPERIMENTAL SCIENCES (NIJSES)* 3 (1): 14-22.