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Phytochemical Interactions of Some Species of Asteraceae (*Vernonia cinerea* L., *Emilia sonchifolia* L. and *Ageratum conyzoides* L.) on the germination and growth pattern of *Sorghum bicolor* L.

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ABSTRACT

Recently, there are scanty of reports of some members of Asteraceae that produce substances that inhibit the growth and development of crops and weeds. This research is therefore aimed at ascertaining the possible phytochemical interactions of some species of Asteraceae (*Vernonia cinerea* L., *Emilia sonchifolia* L. and *Ageratum conyzoides* L.) on the germination and growth pattern of *Sorghum bicolor* L. The objectives of the studies were to evaluate the phytochemical constituents of the selected plant species, ascertain the interaction of the phytochemical constituents on the germination and growth pattern of *Sorghum bicolor* L. Water extract of the shoot and root of each species where obtained and used to check the effects on the germination and growth pattern of the focused crop. 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. 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. Seeds treated with extracts had 75 % germination while the control had 100 % germination. The result further revealed that the seeds treated with the extracts had delayed germination time (5.23 days to 6.0 days) as against 4.67 days of the control. Again, there were inhibition of germination due to the extracts. Also, the growth of the control seedling was significantly lower than those of the extracts treated seedlings. A mean plant height of 36.33 cm was recorded for the control seedling while the extracts treated seedlings recorded plant heights in the range of 39.67 cm (*A. conyzoides*) to 40.67 cm (*V. cinerea*). Based on the findings, it was observed that the selected weeds contain many different phytochemicals habouring numerous active principles within them. These

phytochemicals exhibit influence on plants both positively and negatively. it could therefore be concluded that the delayed germination and varied germination rate of the test species after treatment by extracts may be as a result of the phytochemicals present in the extracts which might release into the soil and these are probably involved in the growth inhibitory effect of the crop species.
Keywords: phytochemical interactions, germination, growth, Asteraceae, *Vernonia cinerea* L., *Emilia sonchifolia* L., *Ageratum conyzoides* L., *Sorghum bicolor* L

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 [1-4]. 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 [5-6]. 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 [7-9]. These effects are selective and concentration dependent and may have an either inhibitory or stimulatory effect on the growth of subsequent crops or weeds [10-15]. This implies that some weeds species have the capacity to inhibit the seed germination and growth of other neighboring plant species in their immediate surroundings. Hence some plant species exude useful phytochemicals that inhibit/suppress seed germination and weed growth [16-23]. These phytochemicals are generally phenolics (such as tannins), alkaloids, steroids, terpenes, saponins, and quinones that affect the growth and development of certain plant species [24-30]. These phytochemicals affected many cellular processes in target plant species, including disruption of membrane permeability [6], ion uptake [8], inhibition of electron transport in both photosynthesis and the respiratory chain [1-6], cause damage to DNA and protein, alterations of some enzymatic activities (Anaya and Pelayo-Benavides, 1997 and Cruz-Ortega *et al*., 1998) and ultimately lead to programmed cell death [9]. Thus, the phytochemicals affected many cellular processes in target plant species, including disruption of membrane permeability [8]. 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 [12] 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 [12].

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 interactional effects of phytochemicals of the selected plants on the germination and growth pattern of *Sorghum bicolor* L.

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 70º 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 [30].

Determination of the Interaction Effect of the Extracts on the Germination and Growth Pattern of Guinea corn: The experiment was laid in a complete randomized design (CRD) and was extended over a period of seven days to allow the last seed germination. Accordingly, five seeds each of guinea corn (*Sorghum bicolor* L.) was soaked in the 5mg extract from each of the selected weeds and allowed to stay for 30 minutes. Thereafter, the soaked seeds were planted in soil bags containing 500 g of top soil. A control bag was set up for each of the four crop seeds in which the seeds where not soaked. All the planted soils in the bags, with their respective labels, were put in a screen house with unhindered access to light and water. The planted seeds in the screen house were observed daily for germination. Germination time (in days) from the date of planting to the time of emergency of plumule. The germination and growth was allowed to take place at room temperature. After germination, three seedlings were reserved for monitoring the effect of extract on growth. The effect on growth was assessed using growth parameter. The growth parameter was measure from the base to the tip of the longest vine. The measurements were done weekly for four weeks. Data collected were analysed to obtain the means of three replicates for each plant type with their standard deviation. Results from the treated plants were compared with those of the respective control plant and recorded. Readings were recorded for each of the three seedlings in each base (triplicate measurements) and a mean and standard deviation were taken from there. The effect was determined in terms of the difference between the performance of the control (untreated seeds) and the experiment (seeds treated with extract).

Determination of Percentage Germination: The germination test was carried out in sterile petridishes of 12cm in size placing a Whatman No. 3 filter paper on petrishes. The aqueous extract of each concentration was added to each petridish of respective treatment daily in such an amount just to allow for the getting of the favourable moisture for germination and growth at room temperature to observe the percentage of germination. Four seeds of test plants were placed in petridish replicating three times and later to be transferred to trays containing soil for their survality. The experiments were extended over a period of seven days to allow the last seed germination. The seed was considered as germinated when the radical emerged and the germination was recorded daily. The results were determined by counting the number of seeds germinated.

$$\text{Germination percentage} = \frac{\text{Number of seed germinated x 100}}{\text{Total number of seeds sown}}$$

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.

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 Osuagwu and Ihenwosu (2014). 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) 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:

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

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 ($p<0.05$).

Effect of Extract Germination and Growth of *Sorghum bicolor (L)* seeds

Result in Table 2 showed the interactional effect of extracts on the germination and growth of guinea corn (*Sorghum bicolor)* seeds. Seeds treated with extracts had 75 % germination while the control had 100 % germination. On the other hand, the seeds treated with the extracts had delayed germination time (5.23 days to 6.0 days) as against 4.67 days of the control. Again, there were inhibition of germination due to the extracts. Also, the growth of the control seedling was significantly lower than those of the extracts treated seedlings. A mean plant height of 36.33 cm was recorded for the control seedling while the extracts treated seedlings recorded plant heights in the range of 39.67 cm (*A. conyzoides*) to 40.67 cm (*V. cinerea*). There were no significant variations between the growth of the seedlings treated with different allelopathic plant extracts.

Table 2: Effect of Plant Extract on the Germination and Growth of Guinea corn (*Sorghum bicolor* L.)

Plant Extract	Germination Time (days)	Percentage Germination	Week 1 Plant Height (cm)	Week 2 Plant Height (cm)	Week 3 Plant Height (cm)	Week 4 Plant Height (cm)
Emilia sonchifolia	$6.00^{a} \pm 0.00$	75	$11.00^{ab} \pm 1.00$	$18.33^{b} \pm 1.53$	$27.00^{a} \pm 1.73$	$40.33^{a} \pm 0.58$
Ageratum conyzoides	$6.00^{a} \pm 0.00$	75	$10.33^{b} \pm 0.58$	$17.00^{b} \pm 0.58$	26.00 ± 1.73	$39.67^{a} \pm 1.53$
Vernonia cinerea	$5.67^{ab} \pm 0.58$	75	$11.00^{a} \pm 1.00$	$11.33^{b} \pm 0.58$	$27.33^{a} \pm 1.16$	$40.67^{a} \pm 0.58$
Control	$4.67^{b} \pm 0.58$	100	$12.33^{a} \pm 0.58$	$20.67^{a} \pm 1.53$	$23.67^{b} \pm 0.58$	$36.33^{b} \pm 1.53$

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

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. 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 ($p < 0.05$). 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. Most of the phytochemicals found in the plants are associated with potency against microorganism. Early studies show that the efficiency of plants of use as potent agents is a function of their phytochemical concentrations [24-30]. Some chemical substances found in plants like alkaloids, are associated with toxicity and are able to cause physiological changes in living things [10]. Alkaloids are also reported to be one of the basic raw materials for the manufacturing of noval drugs and chemicals [20-25]. *A. conyzoides* contains many metabolites: Flavonoids, chromenes, benzo Furans and terpenoids [6] and some of them are inhibitory to other plant. These finding is in correlation with [8] allelopathic plants contain different classes of phytochemicals like phenolic compounds, flavonoids, terpenoids, alkaloids, steroids, carbohydrates, and amino acids.

In Table 2 the results showed the interactional effect of extracts on the germination and growth of guinea corn (*Sorghum bicolor*). It was observed from the results that the selected extracts to an extent suppressed the germination pattern of guinea corn (*Sorghum bicolor*) to 75 % as against the control (100 %). This could be as a result of interactional effect from the extracts of various selected weeds species studies. The findings are line with the findings of [17] who reported that allelopathic plants inhibited or suppress germination, growth, development or metabolism of crops due to secretion of allelochemicals to the rhizosphere of neighboring crop plants. Hence, various phenolic compounds inhibited cell division [17]. The findings were in conformity with the findings of [21] who observed that lowering in germination rate of crops is due to allelochemical stress may be because of inhibition of water uptake. These allelochemicals affected many cellular processes in target plant species, including disruption of membrane permeability [12], ion uptake [15], inhibition of electron transport in both photosynthesis and the respiratory chain [1,4,8,10], cause damage to DNA and protein, alterations of some enzymatic activities [8,11,15] and ultimately lead to programmed cell death (Ding *et al*., 2007). Thus, the allelochemicals affected many cellular processes in target plant species, including disruption of membrane permeability [6]. In furtherance analysis, the

result also shown that the extracts affected the growth of the seed crops with significant different. The phytotoxic allelochemicals influence a number of physiological reactions. There effect depend on the concentration of the compound released. The effects of one plant on another plant may be both stimulatory and inhibitory, but the effect depends on the concentration of the released compounds [12].

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 phytochemicals exhibit influence on plants both positively and negatively. it could therefore be concluded that the delayed germination and varied germination rate of the test species after treatment by extracts may be as a result of the phytochemicals present in the extracts which might release into the soil and these are probably involved in the growth inhibitory effect of the crop species.

Recommendations: Based on the findings recommendations was made: Government through the Ministry of Agriculture should show strong political will in funding research in agro-allied products and reward the researchers commensurately.

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