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Research Article

Allelopathic potential of *Asystasia gangetica*: A study on growth and production of sweet corn

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ABSTRACT

Coromandel, or Chinese violet (Asystasia gangetica), is an invasive weed on many plantations in Indonesia, especially oil palm plantations. The A. gangetica is suspected to produce allelopathic compounds. However, the evaluation of the effect of A. gangetica on plant growth is still rare. The research objective was to evaluate the effect of allelopathic compounds of A. gangetica on the growth and production of sweet corn as a test plant. An experiment with a randomized complete block design and four replications was conducted from March to September 2022 at the Agribusiness and Technology Farm IPB. The treatment was the A. gangetica population consisted of 0 (control), 1, 2, 4, 8, and 16 individuals per pot. A. gangetica were initially planted from seeds, and the stems were slashed 5 cm above the soil surface two months after planting. One week after cutting, sweet corn seeds were planted and maintained until harvest 72 days after planting. The results showed that the allelopathic effect of A. gangetica was evident in growth of sweet corn plant. Increasing number of A. gangetica per pot increased the allelopathic effect. The most significant effect was from 16 populations per pot, which significantly reduced the growth of sweet corn height, stem diameter, leaf size (length and width), leaf number, and color. The particular population per pot also decreased sweet corn yield, i.e., weight per cob with and without husk, and cob diameter by 18.95%, 22.0%, and 19.37%, respectively. The level of sweetness decreased by 31.24% after sweet corn was planted in the remnant of 16 individuals A. gangetica per pot. Nevertheless, A. gangetica did not significantly affect leaf area index, cob length, and sweet corn biomass, including shoot and root dry weight at harvest. It would be interesting to evaluate the effect of A. gangetica in the field.

Keywords: allelopathy; Brix; indole-3-carboxaldehyde; secondary metabolites; weeds

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INTRODUCTION

Coromandel, or Chinese violet (*Asystasia gangetica* (L.) T. Anderson), is an invasive weed (Rosleine & Khalishah, 2024; Khalida et al., 2022; Barbaza et al., 2021; Suzuki et al., 2019). *Asystasia gangetica* (Acanthaceae) is a fast-growing herbaceous plant native to India and East Asia (Dilkalal et al., 2021; Janakiraman et al., 2022). *A. gangetica* qualifies as a cover crop in mature oil palm plantations (Asbur et al., 2018). The cover crop under oil palm is an act of soil and water conservation with the goal of sustainable oil palm plantation management, namely responsibility for the environment, natural resources, and biodiversity (RSPO, 2018).

A. gangetica was reported to be tolerant at shade levels up to 90%, increased soil carbon stocks by up to 119%, and increased soil infiltration capacity by up to 42% (Suryana et al., 2019; Satriawan et al., 2020; Khalida et al., 2022). *A. gangetica* is an invasive weed that grows on plantations, especially in mature oil palm plantations. The released allelopathic compounds can inhibit the growth of surrounding plants, especially oil palm as the main crop. Allelopathy is a phenomenon of chemical interactions through the release of secondary metabolites from one organism that affects the germination, growth, and development of other organisms (Kato-Noguchi & Kurniadie, 2022). Suzuki et al. (2019) reported that *A. gangetica* contained allelopathic compounds in indole-3-carboxaldehyde and (6R,9S)3-oxo-α-ionol, which inhibited the growth of indicator plants. Indole-3-carboxaldehyde compounds were detected in *Brassica oleracea* (Brassicaceae). Leaf extracts of *B. oleracea* suppressed the germination of paddy rice seeds (Poaceae) and the growth of plumula and radicle of corn seeds (Poaceae) (Cong et al., 2022).

Information regarding the potential allelopathic compounds contained in *A. gangetica* and their effect on the growth and production of mature oil palm plants has not been widely reported. This research aims to determine the potential *of A. gangetica* to inhibit the growth and production of oil palm plants by using sweet corn plants as test plants or indicator plants in testing the adverse effects of allelopathic compounds.

MATERIALS AND METHODS

The experiment was conducted from March to September 2022 at the Agribusiness and Techno Park (ATP) Farm, IPB Darmaga, Bogor, Indonesia. The average rainfall, temperature, and humidity at the locations were 391.3 mm/day, 26 °C, and 74.9%, respectively (BMKG, 2022).

The study used a completely randomized block design with six treatments and four replications. *A. gangetica*'s seeds were planted at six population levels, i.e., 0 (control), 1, 2, 4, 8, and 16 individuals per pot. *A. gangetica*'s seeds were obtained from the Leuwikopo Experimental Field IPB. The seeds were selected in ±2 months old pods that were brown to black, black hard seeds and sank in the water. The experimental unit was a pot seized 25 cm in diameter and 19 cm in height. The pot was filled with planting media, a mixture of topsoil, and goat manure in a ratio of 3:1 (w/w), with 3 kg of media per pot.

After *A. gangetica* reached 8 WAP (the week after planting), the stems were cut 5 cm above the soil surface. This aims to eliminate competition between *A. gangetica* individuals and stimulate the release of allelopathic compounds into the soil. Furthermore, *A. gangetica* was left one week after cutting without watering.

To measure the compound released into the soil, soil samples were taken around the roots of *A. gangetica* as many as three points per pot and then composited. The soil was dried and then pulverized and sieved to remove root tissue. About 100 g of soil samples were soaked using 300 mL of methanol for 48 hours and then filtered using a filter cloth. The maceration process was conducted twice. All soil samples were analyzed using the HPLC (high-performance liquid chromatography) method with a RID-10A refractive index detector (Shimadzu, Japan). The column used was YMC-Triart C18 (150 mm × 4.6 mm) with a temperature of 40 °C and a particle size of 5 µm (stationary phase). The mobile phase used water and methanol with a ratio of 70% (v/v): 30% (v/v), a flow rate of 1 mL min^{-1} with 10 µL sample injection volume.

Sweet corn seeds were planted one week after cutting *A. gangetica*, and two seeds were sowed in a pot. At 2 WAP, one plant was selected and maintained until harvest. Sweet corn was fertilized using 2 g Urea, 1.5 g SP-36, and 1 g KCl per pot. Urea was given twice, namely 2/3 at planting and 1/3 at 4 WAP. All doses of SP-36 and KCl were given entirely at planting. Pest and disease control was done by spraying insecticides twice a week with a concentration of 2 mL L^{-1} and a spray volume of 150 L ha^{-1}. Sweet corn was watered twice daily at 80% of field capacity, which was 250 mL per pot, except there was an incident of heavy rain. Sweet corn was harvested at 72 DAP (the day after planting). The harvesting time was indicated by tassels and cob hair, which had already dried, and the seed was shiny yellow. After harvest, the pot was soaked in water overnight until the soil fell out to obtain sweet corn roots.

Sweet corn growth was observed every two weeks from 2 WAP to 10 WAP, including plant height above ground level, leaf length, leaf width, leaf greenness, number of leaves, cob diameter, and leaf area index. The leaf area was measured using ImageJ and calculated using a leaf area index value. Leaf greenness was determined by comparing it to the Munsell® Plant Tissue Color Chart at 6 WAP. Sweet corn production was measured at harvest, including biomass dry weight, shoot dry weight, root dry weight, weight per cob with and without husk, cob size, and sweetness level. The dry weight was observed after the biomass, shoot, and root samples were oven-dried at 80 °C for 2 × 24 hours. The sweetness level of sweet corn was analyzed using a refractometer.

Observational data were analyzed using the F-test (ANOVA). When ANOVA showed a significant effect of treatments, further analysis was carried out using Duncan's multiple range test (DMRT) at the level of α = 5% using SAS 9.4 software.

RESULTS AND DISCUSSION

Allelopathic content

HPLC analysis showed that indole-3-carboxaldehyde was identified in the soil with *A. gangetica*. It indicated that allelopathic compounds were released into the soil (Table 1). Plants could release allelopathic compounds whether the plant was alive or dead. Suzuki et al. (2019) reported that the leaves and stems of *A. gangetica* contained the allelopathic compound of indole-3-carboxaldehyde and suppressed the growth of indicator plants. Table 1 showed that the higher the *A. gangetica* population, the higher the *A. gangetica* dry weight produced. *A. gangetica* dry weight is related to the concentration of allelopathic compounds produced and the number of them released into the soil. The highest concentration of allelopathic compounds was in soil planted with *A. gangetica* at 16 populations treatment with a dry weight of 8.82 g per pot and a concentration of 0.93%, which means that the total released allelopathic compounds per pot amounted to 139.95 g. The allelopathic content in the control was thought to come from plants that grew and decomposed in the planting medium (Table 1).

Table 1. Weed dry weight, allelopathic compound content, and the number of allelopathic compounds in different populations of *A. gangetica* weed per pot.

Weed population of *A. gangetica* per pot	Weed dry weight (g per pot)	Allelopathic compound content (% w/w)[a]	Amount of allelopathic compounds (g per pot)
0	0.00d	0.06	9.15f
1	4.16c	0.47	69.90e
2	4.75bc	0.48	71.85d
4	5.06b	0.49	73.95c
8	5.47b	0.51	76.95b
16	8.82a	0.93	139.95a

Note: Values followed by different letters in the rows and columns are significantly different at the 5% DMRT test. [a] w/w= Allelopathic compound weight per soil sample weight.

The treatment of *A. gangetica* in populations 1 to 8 produced similar dry weights (Table 1). Therefore, the concentrations of allelopathic compounds produced were also similar. The fact is speculated that intraspecific competition between individuals of *A. gangetica* during the growth period could be present. Intraspecific competition is competition between individuals of the same species in fighting overgrowth factors such as light, nutrients, water, and growing space. The effect of the intraspecific competition is stronger than the interspecific competition because the need for growth factors is the same (Adler et al., 2018; Prati et al., 2021). It is difficult to distinguish between competition and allelopathy factors in nature because environmental factors such as climate, light, humidity, temperature, and others cannot be controlled (Khanh et al., 2018). *A. gangetica* leaves extracted with methanol had the highest phenolics, condensed tannins, and saponins. Polyphenols, including novel isovitexin, genestin, syringic acid, and caffeic acid, were the primary metabolites identified (Dilkalal et al., 2024). Phytochemical analysis on different extracts of *A. gangetica* reported that the plant contains steroids, sugars, phenolics, flavonoids, saponins, tannins and amino acids, alkaloids, terpenoids, quinines, and carbohydrates (Barbaza et al., 2021).

Plant height, leaf length, leaf width, and leaf number

The treatment of weed populations influenced the plant height at 2-4 WAP (Table 2). Starting from 8 populations per pot decreased the height compared to the control at 2-4 WAP but tended not to differ from the control in 1-4 populations treatment. Sweet corn plants grown in *A. gangetica* at 16 populations treatment showed the lowest plant height of 27.1% and 28.9% at 2 and 4 WAP compared to the control, respectively. The plant height in all treatments showed no difference at 6 WAP. Allelopathic compounds released by *A. gangetica* might affect the physiological process, especially at the beginning of the germination stage, suppressing plant height at the beginning of growth. Increasing the concentration of allelopathic compounds in the soil decreases water imbibition in seeds, thus affecting cell elongation and division activity.

Table 2. Plant height of sweet corn at different populations of *A. gangetica* weed per pot.

Weed population of *A. gangetica* per pot	Plant height (cm)		
	2 WAP	4 WAP	6 WAP
0	50.53a	107.53a	121.88a
1	47.48ab	99.78ab	115.75a
2	46.10ab	98.13ab	116.25a
4	45.98ab	94.78ab	113.50a
8	42.40b	89.00bc	113.00a
16	35.90c	78.35c	112.13a

Note: Values followed by different letters in the rows and columns are significantly different at the 5% DMRT test.

The treatment of weed populations affected the leaf length of sweet corn (Table 3). The number of *A. gangetica* gave a lower leaf length than the control at 4-6 WAP. Starting from 4 populations per pot decreased leaf length compared to the control at 4-6 WAP but tended not to differ at 1-2 populations. Leaf length tended not to differ from the control at 2 WAP and 8-10 WAP. The higher *A. gangetica* population proved to reduce leaf length at 4 and 6 WAP. The lowest leaf length was in 16 populations treated for *A. gangetica*, where the leaf length decreased by 39.4% and 22.3% at 4 and 6 WAP, respectively. The leaf length of some plants became shorter at 10 WAP than the previous week due to the drying of the leaf tips.

Table 3. Leaf length of sweet corn at different populations of *A. gangetica* weed per pot.

Weed population of *A. gangetica* per pot	Leaf length (cm)				
	2 WAP	4 WAP	6 WAP	8 WAP	10 WAP
0	12.23ab	50.98a	79.63a	74.25a	71.75a
1	12.53a	47.00ab	75.13a	71.13a	70.38a
2	11.53ab	47.75ab	73.25a	72.50a	71.13a
4	10.95ab	44.63bc	65.00b	72.25a	70.38a
8	10.58b	40.75c	65.75b	75.25a	73.00a
16	11.33ab	30.88d	61.88b	68.75a	73.50a

Note: Values followed by different letters in the rows and columns are significantly different at the 5% DMRT test.

The number of weeds affected sweet corn's leaf width (Table 4). Starting from 1 and 8 populations, the width of the leaves decreased at 4 and 6 WAP. The leaf width in all population treatments showed no difference compared to the control at 2 WAP and 8-10 WAP. The lowest leaf width was sweet corn grown in pot with *A. gangetica* of 16 individuals per pot, especially at 4 WAP, i.e., reduced by 54.9% compared to the control.

Table 4. Leaf width of sweet corn at different populations of *A. gangetica* weed per pot.

Weed population of *A. gangetica* per pot	Leaf width (cm)				
	2 WAP	4 WAP	6 WAP	8 WAP	10 WAP
0	1.53a	3.60a	5.00a	7.75a	7.75a
1	1.55a	3.18b	4.88ab	7.13a	7.13a
2	1.53a	3.18b	4.75ab	7.50a	7.50a
4	1.50a	2.90b	4.63ab	7.13a	7.13a
8	1.43a	2.53c	4.38bc	7.00a	7.00a
16	1.45a	2.00d	4.00c	7.00a	7.00a

Note: Values followed by different letters in the rows and columns are significantly different at the 5% DMRT test.

The number of weed treatments affected the number of leaves of sweet corn (Table 5). Starting from 8 populations decreased the number of leaves compared to the control and tended not to differ in the treatment of 1-4 populations at 8-10 WAP. The number of leaves in all population treatments showed no difference at 2-6 WAP. The lowest number of leaves was in *A. gangetica* at 16 populations treatment at 13.6% and 19.1% at 6 and 8 WAP, respectively. The controls had 11-12 leaves (the average: 11.8 leaves). The treatments of 8 and 16 individuals reduced 1-3 leaves.

Table 5. Leaf number of sweet corn at different populations of *A. gangetica* weed per pot.

Weed population of *A. gangetica* per pot	Number of leaves				
	2 WAP	4 WAP	6 WAP	8 WAP	10 WAP
0	3.5a	3.8a	5.5ab	11.8a	11.8a
1	3.5a	3.8a	5.8a	12.0a	12.0a
2	3.5a	3.5a	5.3ab	11.0ab	11.0ab
4	3.3a	3.5a	5.0ab	12.0a	12.0a
8	3.3a	3.5a	4.8b	9.8b	9.8b
16	2.8a	3.8a	4.8b	9.5b	9.5b

Note: Values followed by different letters in the rows and columns are significantly different at the 5% DMRT test.

It is important to note that the effect of *A. gangetica* on plant height, leaf length, leaf width, and number of leaves of sweet corn was insignificant at the end of the observation. Probably, the allelopathic compounds in the soil were markedly reduced. The factors causing the reduction of allelopathic compounds in the soil could be soil microorganisms, photodecomposition, volatilization, chemical decomposition, apoplast adsorption by the surface of plant roots, and adsorption by soil colloids (Curran, 2016). It is interesting to study and determine the factors affecting the availability of allelopathic from *A. gangetica* in the soil.

Stem diameter, leaf area index, and leaf greenness

The treatment of weed populations affected the stem diameter of the sweet corn (Table 6). Starting with one population, the stem diameter was reduced at 2 WAP and 8-10 WAP, but it was not different from the control at 4 WAP in the 1-8 population treatment and at 6 WAP in the treatment of 1 population. However, 16 populations at 4 WAP and 2-16 populations at 8-10 WAP differed from the control (Table 6).

The stem diameter decreased as the weed population increased from 1-16 compared to controls at 2-10 WAP (Table 6). The 16 populations gave the lowest stem diameter, especially at 4 WAP and 6 WAP, namely 31.4% and 24.9%, compared to the control. The treatment of 16 individuals per pot reduced stem diameter by 0.5-0.8 cm as compared to the control at the end of the observation.

Table 6. Stem diameter of sweet corn at different populations of *A. gangetica* weed per pot.

Weed population of *A. gangetica* per pot	Stem diameter (cm)				
	2 WAP	4 WAP	6 WAP	8 WAP	10 WAP
0	1.27a	1.87a	2.26a	2.74a	2.48a
1	1.03b	1.74a	2.10ab	2.35b	2.09b
2	1.00b	1.64ab	1.90bc	2.33b	2.06b
4	0.98bc	1.64ab	1.87bc	2.17b	1.87bc
8	0.81bc	1.51ab	1.81c	2.18b	1.88bc
16	0.74c	1.28b	1.70c	2.12b	1.66c

Note: Values followed by different letters in the rows and columns are significantly different at the 5% DMRT test.

The population's treatment of *A. gangetica* did not affect the leaf area index of sweet corn plants (Table 7). Leaf area index values ranged from 4.0 to 5.3. In general, the leaf area index is a variable that shows the relationship between leaf area and area covered. Thus, the number of leaves and the total leaf area of the plant influenced the leaf area index.

The population's treatment affected the leaf greenness of the sweet corn plant (Table 7). The higher number of *values* will be brighter, and the higher number of *chroma* will be purer at the resulting color. The code for greenish leaf color in each treatment ranged from 5GY 6/8 to 7.5GY 7/10. Treatments of 1 to 8 populations showed similar greenish leaf color codes. However, the 16 populations have a *value* greater than the other treatments, so the leaves are greener (tend to be paler) than the other weed treatments.

Table 7. Leaf area index and leaf greenness of sweet corn at different populations of *A. gangetica* weed per pot.

Weed population of *A. gangetica* per pot	Leaf area index	Leaf greenness (s(h) v/c)[b]
0	5.2	7.5GY 6/8
1	5.3	5GY 6/8
2	4.0	7.5GY 6/8
4	4.6	7.5GY 6/8
8	4.3	7.5GY 6/8
16	4.7	7.5GY 7/10

Note: [b] GY = grey yellow; s = spectrum; h = hue; v = value, and c = chroma

The leaves' pale greenish color is thought to result from disruption of chlorophyll formation because of allelopathic compounds released by *A. gangetica*. Allelopathic compounds in *Brassica oleracea* (Brassicaceae), namely indole-3-carboxaldehyde, were able to reduce chlorophyll content in rice plants (Poaceae) (Khaliq et al., 2013). Elisante et al. (2013) also reported that alkaloids allelopathic compounds from plant seeds and leaves, *Stramonium datura,* scopolamine, and hyoscyamine, reduced the chlorophyll content of *Cenchrus ciliaris* (Poaceae).

Weight per cob, cob size, and Brix level

The treatment of weed populations affected the weight per cob with and without husks of sweet corn (Table 8). The treatment of 1-8 populations did not show any difference compared to the control in weight per cob but began to show differences in 16 populations treatment. The treatment of 16 populations gave the lowest weight per cob, 19.0%, compared to the control. Reduction in weight per cob in populations 1, 2, 4, and 8 *A. gangetica* respectively by 2.3%, 4.0%, 5.5%, and 7.7% compared to the control.

Treatments of 1-4 populations tended to show no difference compared to the control in the observed weight per cob without husks but began to show differences in the 8-16 populations treatment. The treatment of 16 populations gave the lowest weight per cob without husk, 22.1%, compared to the control. Reduction in weight per cob in populations 1, 2, 4, and 8, respectively 0.5%, 2.7%, 7.4%, and 14.3% compared to the control. This contradicts the research by Alvionita et al. (2016) that corn cob weight is more sensitive to *Rottboellia exaltata* followed by *Cyperus rotundus*, compared to *Asystasia gangetica*.

Table 8. Weight per cob, cob size, and cob sweetness level of sweet corn plants at various populations of *A. gangetica* weed per pot.

Weed population of *A. gangetica* per pot	Weight per cob with husk (g per plant)	Weight per cob without husk (g per plant)	Cob length (cm)	Cob diameter (cm)	Sweetness level (Brix)
0	284.25a	188.63a	12.25	4.13a	13.38a
1	277.63a	187.63a	12.88	3.91ab	11.55ab
2	273.00a	183.63ab	11.33	3.73b	10.88ab
4	268.50a	174.75ab	11.50	3.64b	10.33b
8	262.25a	161.63bc	12.58	3.67b	9.83b
16	230.38b	147.00c	12.48	3.33c	9.20b

Note: Values followed by different letters in the rows and columns are significantly different at the 5% DMRT test.

The treatment of weed populations did not affect the length of the cob (Figure 1) but did affect the diameter of the corn cob (Table 9). Cob length ranged from 11.33-12.88 cm. Stem diameter at 1 population was not different compared to the control. However, starting from 2 populations reduced the stem diameter. The treatment of 16 populations gave the lowest stem diameter of 19.4% compared to the control. Decreased stem diameter at 2, 4, and 8 A. gangetica populations, respectively, by 5.5%, 12.0%, and 11.3% compared to the control.

The treatment of weed populations influenced the sweetness level of the cobs. The sweetness level in the 1 and 2 populations did not differ from the control, 13.6% and 18.7%, respectively. However, starting from 4 populations were able to reduce the sweetness level. The treatment of 16 populations gave the lowest sweetness, 31.2% compared to the control. The sweetness level decreased in 4 and 8 populations, respectively, 22.8% and 26.5% compared to the control.

The sweetness level decreased as the *A. gangetica* population increased per pot. Farhoudi and Lee (2013) reported that the allelopathic compounds of barley extract (*Hordeum spontaneum*) affect Sucrose synthase activity from the Poaceae family plants *Hordeum spontaneum* and *Avena ludoviciana*. Sugar synthase activity is closely related to the sugar metabolism process in sink tissue cells toward cellulose, callose, and starch synthesis (Stein and Garnot, 2019).

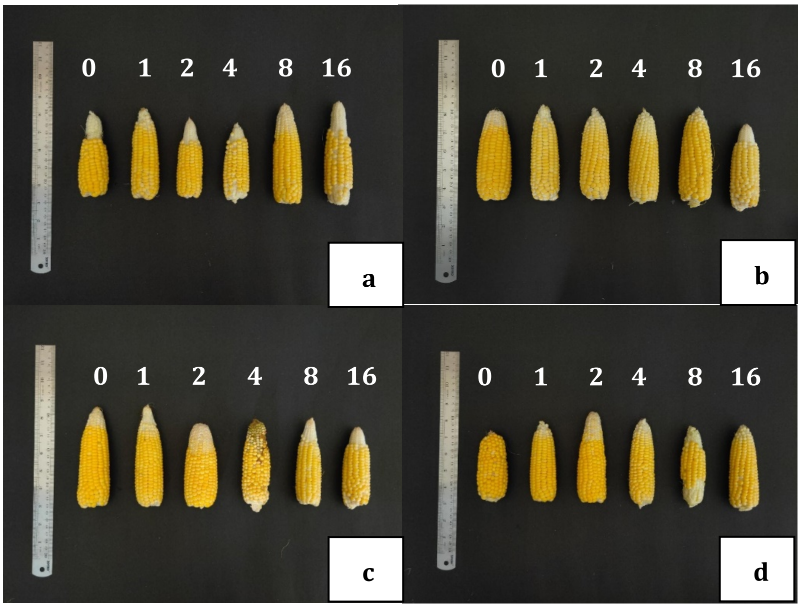

Figure 1. Cob condition at various populations of *A. gangetica* per pot. Letters in the figure indicate the replication of a, b, c, and d. Numbers in the figure indicate weed populations of 0, 1, 2, 4, 8, and 16 *A. gangetica* per pot.

Biomass, shoot, and root dry weight

The treatment of the number of weeds did not affect the dry weight of biomass, dry weight of shoots, and dry weight of roots per sweet corn plant at harvest (Table 9). The condition of the roots of the sweet corn plants at harvest did not show any difference between treatments in each replication (Figure 2). The dry weight of biomass per plant ranged from 82-91.5 g, the dry weight of shoots per plant ranged from 68-75.75 g, and the dry weight of roots per plant ranged from 14-15.75 g.

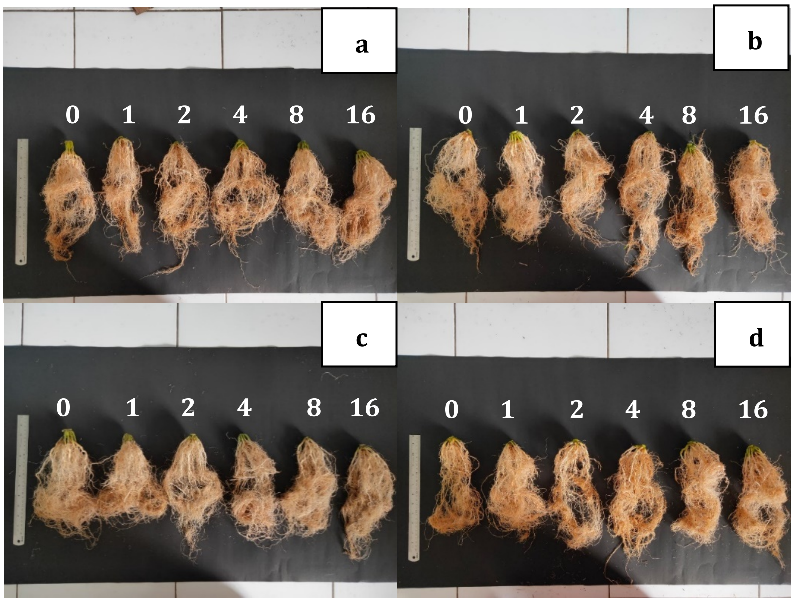

Figure 2. Root condition at various populations of *A. gangetica* per pot. Letters in the figure indicate the replication of a, b, c, and d. Numbers in the figure indicate weed populations of 0, 1, 2, 4, 8, and 16 *A. gangetica* per pot.

These results differ from those of Elisante et al. (2013), who reported that competition of cultivated plants with allelopathy reduced the relative growth rate and production of *Cenchrus ciliaris* (Poaceae) plant dry matter. Allelopathic compounds inhibited root growth, making the root color brown and the root hairs dysfunctional (Bhatla, 2018).

However, allelopathic compounds released by *A. gangetica* can reduce the dry production of sweet corn plants. It is proven that 16 *A. gangetica* population treatment reduced dry production in biomass dry weight, shoot dry weight, and root dry weight per plant. Treatment of 16 individual *A. gangetica* populations reduced the dry weight of biomass per plant by 10.38%, the dry weight of shoots per plant by 10.23%, and the dry weight of roots per plant by 11.11% compared to the control (Table 9). Treatment of *A. gangetica* populations did not differ from the control in reducing the dry weight of biomass and shoots in populations of 1-8 *A. gangetica* and decreased root dry weight in populations of 1-4 *A. gangetica*.

Table 9. Dry weights of sweet corn biomass, shoots, and roots and percent reduction at different populations of *A. gangetica* weed per pot.

Weed population of *A. gangetica* per pot	Biomass dry weight (g per plant)	Biomass dry weight %[c]	Shoot dry weight (g per plant)	Shoot dry weight %[c]	Root dry weight (g per plant)	Root dry weight %[c]
0	91.50	0.00b	75.75	0.00b	15.75	0.00b
1	87.50	4.37ab	72.50	4.29ab	15.00	4.76ab
2	84.88	7.24ab	70.63	6.77ab	14.25	9.52ab
4	87.25	4.64ab	72.38	4.46ab	14.88	5.56ab
8	83.88	8.33ab	69.75	7.92ab	14.13	10.32a
16	82.00	10.38a	68.00	10.23a	14.00	11.11a

Note: Values followed by different letters in the rows and columns are significantly different at the 5% DMRT test. [c] Percent decrease relative to control.

Allelopathic compounds released by *A. gangetica* into the soil suppress shoot growth more than roots. This is evidenced by the equation in Figure 3, which shows that shoot dry weight has a higher gradient value than root dry weight. The gradient of the dry weight of biomass is y = -0.453x + 88.507. While the comparison of the dry weight gradient of shoots and roots, respectively, is y = -0.372x + 73.424 and y = -0.0811x + 15.087.

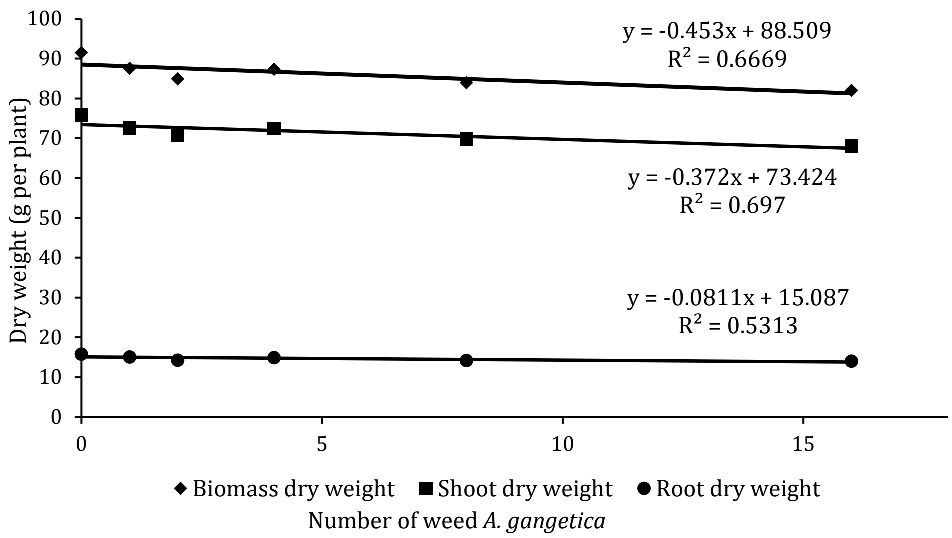

Figure 3. Regression between biomass dry weight, shoot dry weight, and root dry weight per plant against different populations of *A. gangetica* per pot.

CONCLUSIONS

It is proved that the allelopathic compounds released by *A. gangetica* suppressed the growth and production of sweet corn test plants. The higher the population of *A. gangetica,* the more allelopathic compounds are produced, thereby suppressing the vegetative growth and production of sweet corn test plants. This was proven in a population of 16 individual *A. gangetica* was able to suppress the growth and production of the sweet corn test plants, including plant height (2-4 WAP), leaf length (4-6 WAP), leaf width (4-6 WAP), leaf number (8-10 WAP), stem diameter (2-10 WAP), cob diameter, leaf greenness, sweetness level, and weight per cob with and without husks. *A. gangetica* populations do not affect leaf area index, cob length, biomass dry weight, shoots dry weight, and roots dry weight at harvest.

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