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EFFECTS OF ALLELOPATHIC CHEMICALS EXTRACTED FROM VARIOUS PLANT LEAVES ON WEED CONTROL AND WHEAT CROP PRODUCTIVITY

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Abstract

A study on allelopathic effect of leaf water extracts of Eucalyptus, Acacia, Sorghum, Shishum, Sunflower, Poplar, Tobacco and Congress grass on weeds control and growth of wheat cv. Hashim-8 was conducted at Faculty of Agriculture, Gomal University, Dera Ismail Khan during 2012-2013. The findings of this study revealed that allelopathic chemicals in leaf water extracts of these plants significantly suppressed weeds growth by reducing weed density, fresh and dry weed biomass, and encouraged wheat yield and yield components such as days to 50% heading, plant height, tillers m^{-2}, grain $spike^{-1}$, 1000-gain weight, biological and grain yield. Even though minimum fresh and dry weed biomass and highest wheat grain yield and yield related components were observed in twice hand weeding treatment which is economically less feasible on large scale. However, our findings showed an alternative allelopathic technique to minimize weed infestation and boost wheat growth and yield using natural plant material. On the basis of present results, it is recommended that leaf water extracts of Sorghum, Sunflower and Congress grass can be applied twice (30 and 60 DAS) during the growing season to control weeds and to enhance wheat grain yield.

Key words: Wheat, Allelopathy, Allelopathic chemicals, Weed control, Crop productivity.

Introduction

Wheat is an important crop which is successfully grown under different environments due to its flexibility to unfavorable conditions (Alderfasi & Refay, 2010; Rasheed *et al*., 2012). In Pakistan, wheat being the staple has genetic yield potential of 6-8 t ha^{-1} whereas our national average yield is about 2.7 t ha^{-1}. Progressive farmers of irrigated areas are harvesting 6-7 t ha^{-1}. However, yield ranged 0.5-1.3 t ha^{-1} depending on the amount of rainfall in rainfed areas and 2.5-3 t ha^{-1} depending on the amount of water available and other factors in irrigated areas (Qamar *et al*., 2014). These figures indicated around 60% yield gap in wheat which needs to be narrowed. The major reasons for low productivity and variation includes; delayed harvesting of kharif crops such as cotton, sugarcane and rice, and consequently late planting of wheat, unavailability of improved inputs such as seed, inefficient fertilizer use, weed infestation, shortage of irrigation water, drought, terminal heat stress, soil degradation, inefficient extension services, etc. (Ibrahim *et al*., 2013).

One of the important factors we are going to focus in this paper is weeds which compete for water, nutrients and sunlight and significantly reduce crops productivity and quality. In order to control weeds infestation in minimal time farmers use hazardous chemicals (Khan *et al*., 2009a; Tang *et al*., 2010). Continuous use of heavy doses of herbicides is encouraging resistance development in different weeds which endanger the ecosystem. According to Stephenson (2000), most agricultural systems collectively use three million tones of herbicides per year which indicates severity of the issue. Therefore, an alternative method seems inevitable to control or minimize weed infestation. In present study we focused on the use of natural chemicals produced by the plants that might have negative or positive effect on weed or wheat growth which is also known as allelopathy. It is an interference mechanism, in which plant materials (living or dead) release chemical substances, which inhibit or stimulate the associated plant growth (May & Ash, 1990; Mubeen *et al.*, 2011; Elahi *et al*., 2011). It is also assumed that allelopathy, plays an important role in the intraspecific and interspecific plant competition and may determine the type of interspecific association between them. The plant may exhibit inhibitory or rarely stimulatory effects on germination and growth of other plants in the immediate vicinity (Jabeen & Ahmed, 2009; Ankita & Chabbi, 2012; Ghafarbi *et al*., 2012).

Using similar allelopathic technique Jabeen *et al.* (2013) suggested that three weed species (*Fumaria indica*, *Asphodelus tenuifolius* and *Euphorbia hirta*) produced allelopathic chemicals which reduced germination as well as the subsequent growth of wheat plant. Similarly, Shinwari *et al.* (2013) reported that *Melilotus officinalis* is the most noxious species due to its maximum inhibition effect shown on the radical growth of *Lactuca sativa* followed by *Melilotus alba*, *Datura stramonium* and *Mirabilis jalapa*, while *Rumex crispus*, *Plantago lanceolata*, *Rumex conglomerates* and *Trifolium pratense* have shown minimum inhibition effect. It is also reported that genetically modified (GM) maize extracts increased the leaf contents of chlorophyll, soluble proteins and activity of superoxide, dismutase and catalase but decreased the contents of chlorophyll a, carotenoid, leaf soluble sugar, proline and activity of peroxidase in wheat crop. While non-GM maize extracts significantly increased leaf content of chlorophyll b, soluble sugar and activity of catalase but decreased the content of chlorophyll a, carotenoid and leaf soluble proteins in succeeding crop wheat (Ibrahim *et al.*, 2013). Similarly, phytotoxic ability of aqueous extracts of new and old mango leaves at different concentrations (2.5, 5.0, 7.5 and 10%) was tested against canary grass and wheat. These results revealed that all the extracts significantly inhibited the germination and growth of canary grass, however, old mango leaves extract was found better as compared to new ones, because it

moderately enhanced the wheat germination and growth. It has been concluded that old mango leaves extract could be used as herbicide to suppress canary grass and to enhance wheat growth (Saleem *et al.,* 2013).

In another study, seven obnoxious weeds (*Parthenium*, *B. jumea*, *Lantana*, *Calotropis*, *Ipomoea*, *Datura* and *Cynodon*) have significant on germination and seedling vigour of wheat, however, Parthenium leaf extract was identified as most harmful extract for wheat growth (Oudhia, 2001). Similarly, Ashraf & Akhlaq (2007) reported that among separate spray of sorghum roots, stem and leaf water extracts, root water extract was found to be the most effective treatment and reduced weed density in wheat crop. However, among combination of sorghum plant parts water extracts, stem and root water extracts had significantly decreased weed density. Evaluating similar mechanism Khan *et al.* (2009b) reported the allelopathic influence of aqueous extracts of eucalyptus (10, 15 and 20%) had inhibitory effect on wheat seed germination and plant growth. Studying on a combined effects of plant water extracts (Sorghum, Brassica and Sunflower) in combination with reduced rates of herbicide (Bromoxynil + MCPA 20 + 20 EC) on weed control in wheat, Iqbal *et al.* (2010) found that 18 L ha^{-1} plant water extracts combined with Bromoxynil + MCPA (50 g a.i ha^{-1}) inhibited total weeds density by 88%, total weeds fresh weight by 90% and total weeds dry biomass by 95% and increased grain yield by 35% over control and concluded that by the use of allelopathic plant water extracts herbicides use can be reduced up to 50%. Keeping in view the above findings, an experiment was designed to study the allelopathic effect of leaf water extracts of Eucalyptus, Acacia, Sorghum, Shishum, Sunflower, Poplar, Tobacco and Congress grass on weeds control and growth and yield of wheat under climatic conditions of Dera Ismail Khan.

Materials and Methods

Experiment on 'Allelopathic effect of leaf water extracts of Eucalyptus, Acacia, Sorghum, Shishum, Sunflower, Poplar, Tobacco and Congress grass on weeds control and growth of wheat' was conducted at Faculty of Agriculture, Gomal University, Dera Ismail Khan, KPK during 2012-2013. It was laid out on randomized complete block design having four replications with net plot size of 1.8 m × 5 m (9 m^{-2}) including six rows (5 m long and 30 cm apart). The detail of experimental treatments is as under:

T_1	Weedy check (Twice hand weeding)
T_2	Leaf extract of Eucalyptus (*Eucalptus camaldulencis* Dehnh)
T_3	Leaf extract of Acacia (*Acacia nilotica* L. Willd. ex Delile)
T_4	Leaf extract of Sorghum (*Sorghum bicolar* L.)
T_5	Leaf extract of Shishum (*Dalbergia sissoo* Roxb)
T_6	Leaf extract of Sunflower (*Helianthus annus* L.)
T_7	Leaf extract of Poplar (*Populus deltoids* W. Bartram ex H. Marshall)
T_8	Leaf extract of Tobacco (*Nicotiana tobacum* L.)
T_9	Leaf extract of Congress grass (*Parthenium hysterophorus* L.)
T_{10}	Control (No weeding or spray)

The land was given irrigation prior to its final preparation and at *wattar* condition, it was given 3-4 plowings (plough, harrow and planking operations). Manual drilling of wheat (cv. Hasham-8) was done by using skilled labors (100 kg ha^{-1}). All supplementary cultural practices were followed normally as per standard procedure. The recommended doses of NPK fertilizers (150:120:90 kg.ha^{-1}) was applied to all plots. Full dose of phosphorus and potash and half dose nitrogen were applied at the final land preparation stage before seed sowing whereas the leftover nitrogen was applied with 2nd irrigation. Leaf extracts of Eucalyptus, Acacia, Sorghum, Shishum, Sunflower, Poplar, Tobacco and Congress grass were prepared individually by boiling 2 kg leaves and 10 liter distilled water together in a pan for 3 hours and the respective water extract content was sieved through and collected in bottles. The first spray of extracts was applied to weeds (including wheat crop) 30 days after sowing (DAS) while the 2nd spray was done 60 DAS. The parameters recorded during the course of study were fresh and dry weed biomass (g), days to 50% heading, plant height (cm), number of fertile tillers (m^{-2}), grains $spike^{-1}$, 1000-grain weight (g), biological (kg ha^{-1}), grain yield (kg ha^{-1}) and harvest index (%)and analyzed through analysis of variance technique of Statistix version 8.1 and subsequently least significance test (LSD) was applied for comparing and separation of treatment means.

Results

Table 1 showed that different plant water extracts have statistically significant ($p \leq 0.05$) effect on weed density per meter square. Maximum number of weeds (720.50 m^{-2}) were counted in weedy check followed by application of Acacia (715.25 m^{-2}), Poplar (713.75 m^{-2}) and Sorghum (712.50 m^{-2}) extracts whereas minimum weeds (691 m^{-2}) were counted when Eucalyptus extracts was applied followed by Shishum (696.50) and Sunflower (699.75) extracts. As the equal quantity of weed seeds (50 g m^{-2}) were applied to all the plots therefore a non-significant ($p \geq 0.05$) effect on fresh weed weight was observed before spraying the extract. However, a significant ($p \leq 0.05$) difference regarding the dry weed weight before spraying was observed. The data presented in Table 1 also showed that different plant water extracts have significant ($p \leq 0.05$) effect on fresh weed weight after their application. Maximum fresh weed weight (1562.3 g m^{-2}) was recorded in no weeding or spray treatment followed by Acacia (618.8 g m^{-2}), Poplar (616.3 g m^{-2}), Tobacco (608.5 g m^{-2}), Shishum(600.8 g m^{-2}) and Eucalyptus (595.8 g m^{-2}) whereas minimum fresh weed weight of 124.5 g m^{-2} was recorded in hand weeding followed by Sunflower (304.3 g m^{-2}), Congress grass (309.8 g m^{-2}) and Sorghum (319.0 g m^{-2}). Apart from hand weeding treatment (81.18% reduction in fresh weed weight), maximum percent reduction in fresh weed weight was observed by the application of leaf water extracts of Sunflower (53.45%), Congress grass (52.68%) and Sorghum (51.30%) which indicted their strong allelopathic potential against the weed flora in wheat (Table 1). The data in Table 1 depicted that different plant water extracts have significant ($p \leq 0.05$) effect on dry

weed weight after their application. Maximum dry weed weight (74.75 g m^{-2}) was recorded in control treatment (no weeding or spray) followed by Eucalyptus (34.35 g m^{-2}), Poplar (32.85 g m^{-2}) and Acacia (32.15 g m^{-2}) and were statistically at par while minimum dry weed weight was observed in Congress grass (14.12 g m^{-2}),Sunflower (14.47 g m^{-2}), hand weeded (14.65 g m^{-2}) and Sorghum (15.50 g m^{-2}). Highest percent reduction in dry weed weight was observed in hand weeding treatment (64.70%) followed by Congress grass (64.45%), Sunflower (63.57%) and Sorghum (62.20%), which showed a similar trend that was observed in percent reduction of fresh weed weight and indicted their intense allelopathic potential against wheat weeds (Table 1).

Statistical analysis of data regarding days to 50% heading (Table 2) showed that different plant water extracts have significant ($p \leq 0.05$) effects, as maximum days to 50% heading (97.5) were recorded in plots received twice hand weeding (weedy check) followed by Congress grass (95 days) and Sunflower (93 days) while minimum days to 50% heading (77) were counted in control treatment (no weeding or spray) followed by Shishum (81.75 days), Tobacco (82.50 days), Eucalyptus (82.75 days), Poplar (83 days) and Acacia (84 days) and were statistically at par. Data presented in Table 2 exhibited that plant water extracts have significant ($p \leq 0.05$) effect on plant height of wheat. Maximum plant height (141 cm) were recorded in no weeding or spray treatment plots followed by Poplar (137.50 cm), Shishum (137 cm) and Eucalyptus (136.25 cm) while minimum plant height was observed weedy check (113.75 cm) and Sorghum (115 cm) followed by Congress grass (116 cm) and Sunflower (117 cm). Similarly, number of fertile tiller m^{-2} were significantly ($p \leq 0.05$) affected by different plant water extracts (Table 2). Maximum fertile tillers (510.25) were recorded in hand weeding plots followed by Sorghum (490.50), Sunflower (483) and Congress grass (480.25) whereas minimum tillers (225.75) were observed in no weeding or spray plots followed by Tobacco (359), Poplar (368) and Shishum (380.50). Table 2 also indicated that various plant water extracts significantly ($p \leq 0.05$) affected number of grains per spike. Maximum grains per spike (54.25) were recorded in hand weeding plots followed by Sunflower (46.75), Sorghum (46.50) and Congress grass (44.50) while minimum grains per spike (25.00) were observed in no weeding or spray followed by Tobacco (30.25), Shishum (31.50) and Poplar (32) treated plots. Data regarding 1000-grain weight showed significant ($p \leq 0.05$) effects of water extracts (Table 2). Wheat plants received twice hand weeding (weedy check) produced maximum 1000-grain weight (53.50 g) followed by Eucalyptus (52.75 g), Acacia (52.25 g) and Sorghum (51.50 g). However, minimum 1000-grain weight (37.50 g) was recorded when plants were treated with Shishum extract followed by Poplar (47.75 g), Tobacco (49.25 g) and Sunflower (49.25 g) extracts.

Analysis of the biological yield data showed significant ($p \leq 0.05$) differences among means of wheat plants treated with varied plant water extracts (Table 2). Maximum biological yield (9.20 t ha^{-1}) was recorded in hand weeding (weedy check) treated plants followed by Sorghum (8.80 t ha^{-1}), Sunflower (8.72 t ha^{-1}) and Congress grass (8.40 t ha^{-1}) plants extracts while minimum biological yield (5.72 t ha^{-1}) was recorded in control plots (no weeding or spray) followed by plots treated with Tobacco (6.05 t ha^{-1}), Poplar (6.22 t ha^{-1}) and Shishum (6.25t ha^{-1}) extracts. The data presented in Table 2 also showed that different plant water extracts significantly ($p \leq 0.05$) effect grain yield of wheat. Maximum grain yield (4.70 t ha^{-1}) was estimated in hand weeding (weedy check) plots followed by the plants treated with water extracts such as Congress grass (4.39 t ha^{-1}), Sorghum (4.32 t ha^{-1}) and Sunflower (4.24 t ha^{-1}) whereas minimum grain yield (2.46 t ha^{-1}) was produced by no weeding or spray plots followed by the plots treated with Tobacco (2.74 t ha^{-1}), Poplar (2.82 t ha^{-1}) and Shishum (3 t ha^{-1}) extracts. Different plant water extracts have significant ($p \leq 0.05$) effect on harvest index of wheat (Table 2). Highest harvest index (52.32%) was observed in plots treated with Congress grass extract followed by plots received twice hand weeding (51.08%) whereas plants received no weeding or spray showed lowest harvest index (43.03%) followed by plants treated with Poplar (45.30%), Tobacco (45.39%) and Eucalyptus (45.39%) extract.

Table 1. Allelopathic effect of leaf water extracts of various plants on weeds biomass.

Treatments/ Leaf water extracts		Weed density (m^{-2})	Fresh weed weight before spraying (g m^{-2})	Dry weed weight before spraying (g m^{-2})	Fresh weed weight after spraying (g m^{-2})	Dry weed weight after spraying (g m^{-2})	% Reduction in fresh weed weight after spraying	% Reduction in dry weed weight after spraying
T_1	Hand weeding	720.50 a	661.50	41.50 ab	124.5 d	14.65 d	81.18	64.70
T_2	Eucalyptus	691.50 g	647.25	41.25 ab	595.8 b	34.35 b	7.95	16.73
T_3	Acacia	715.25 b	657.00	42.25 a	618.8 b	32.15 bc	5.81	23.91
T_4	Sorghum	712.50 bc	655.00	41.00 ac	319.0 c	15.50 d	51.30	62.20
T_5	Shishum	696.50 f	651.50	39.25 cd	600.8 b	30.70 c	7.78	21.78
T_6	Sunflower	699.75 f	653.75	39.75 bd	304.3 c	14.48 d	53.45	63.57
T_7	Poplar	713.75 bc	656.50	41.00 ac	616.3 b	32.85 bc	6.12	19.88
T_8	Tobacco	705.25 e	649.00	38.25 d	608.5 b	30.48 c	6.24	20.31
T_9	Congress grass	708.00 de	654.75	39.75 bd	309.8 c	14.13 d	52.68	64.45
T_{10}	No spray	710.50 cd	647.50	42.00 a	1562.3 a	74.75 a	-	-
	$LSD_{0.05}$	3.84	NS	1.79	55.93	2.56		

Means followed by different letter(s) in a column are statistically significant at 5% level of probability. NS stands for non-significant

Table 2. Allelopathic effect of leaf water extracts of various plants on growth and yield parameters of wheat.

Treatments / Leaf water extracts		Days to 50% heading	Plant height (cm)	No. of tillers (m^{-2})	No. of grains $spike^{-1}$	1000-grain weight (g)	Biological yield (t/ha)	Grain yield (t/ha)	Harvest index (%)
T_1	Hand weeding	97.50 a	113.75 e	510.25 a	54.25 a	53.50 a	9.20 a	4.70 a	51.09 ab
T_2	Eucalyptus	82.75 de	136.25 bc	387.75 d	34.75 d	52.75 a	7.23 d	3.28 d	45.39 e
T_3	Acacia	84.00 d	134.25 c	390.75 d	32.75 de	52.25 ab	7.28 d	3.34 d	45.90 de
T_4	Sorghum	92.00 c	115.00 de	490.50 b	46.50 bc	51.50 ac	8.80 b	4.32 bc	50.04 bc
T_5	Shishum	81.75 e	137.00 b	380.50 e	31.50 ef	47.50 d	6.25 e	3.00 e	48.08 cd
T_6	Sunflower	93.00 bc	117.00 d	483.00 c	46.75 b	49.25 cd	8.73 b	4.25 c	48.67 c
T_7	Poplar	83.00 de	137.50 b	368.00 f	32.00 ef	47.75 d	6.23 e	2.82 f	45.30 e
T_8	Tobacco	82.50 de	134.50 c	359.00 g	30.25 f	49.25 cd	6.05 f	2.75 f	45.39 e
T_9	Congress grass	95.00 b	116.00 d	480.25 c	44.50 c	49.50 bd	8.40 c	4.40 b	52.32 a
T_{10}	No spray	77.00 f	141.75 a	255.75 h	25.50 g	49.50 bd	5.73 g	2.46 g	43.03 f
	$LSD_{0.05}$	2.20	2.21	6.57	2.12	2.89	0.17	0.14	2.23

Means followed by different letter(s) in a column are statistically significant at 5% level of probability

Discussion

Results of present study indicated that percent reduction in fresh and dry weed weight was observed by the application of leaf water extracts of Sunflower, Congress grass and Sorghum, which indicted their strong allelopathic potential against the weed flora in wheat. These results are in line with Ashraf & Akhlaq (2007) who reported that application of Sorghum roots, stem and leaf water extracts, root water extracts extracts were most effective to reduce weeds fresh weight. Awan *et al.* (2012) reported allelopathic effect of water extracts of Sorghum, Sunflower and *Brassica* on wheat cultivar GA-2002 and found that the highest weed density and biomass suppression was observed in all allelopathic treatments whereas among the foliar application of extracts, the highest weed control was recorded with the combined application of concentrated aqueous extracts of Sorghum, Sunflower and *Brassica* followed by combined application of Sorghum and Sunflower. Similarly, Nikneshan *et al.* (2011) evaluated the allelopathic potential of different Sunflower cultivars on several crops and associated weeds at different concentrations and found that as extract concentration increased from 25 to 100%, the inhibitory effect on germination indices increased, while with 25% extract concentration was observed to have stimulating effects on wheat and *Portulaca oleracea* germination. Out results indicated significant differences among various treatments regarding days to 50% heading, however, there are several factors which affect wheat flowering such as temperature, nutrition, light interception for net assimilate partitioning (Friend *et al.,* 1963). Among these factors low temperature or vernalization is supposed to trigger flower initiation in winter wheat (Limin & Fowler, 2006), therefore, we assumed that the difference in days to 50% heading was due to the competition among various weed plants and wheat crop for light interception that is why wheat plants in control treatment (no weeding or spray) took minimum time to flower (to complete its life cycle). Similarly, findings of present investigation revealed that in control plots (no weeding or spray) wheat plants compete with weeds for light interception and eventually etiolated. Under such plasticity condition whatever light is captured by the wheat plants is rapidly used to complete their life cycle by attaining a desirable plant height (vegetative phase) and flowering (reproductive phase). Such mechanism is very common when plants are grown under some sort of stress condition wherein the survival strategy is altered and plants complete their life cycle in a short span. In present study, the early flowering response reflected similar phenomenon where wheat plants grown in control plots took minimum time to flower after attaining desirable height (McDaniel *et al.,* 1992; McDaniel, 1996; Srivastava, 2002). However, varied response of wheat plant height by the application of different leaf water extracts could be due to their allelopathic effect on wheat vegetative growth, which consequently suppressed plant height (115.00 to 137.50 cm). Similar results were observed when concentrated extracts (50 and 75%) of *Chenopodium album* L. (Majeed *et al.,* 2012) and Sorghum plant parts extracts such as stem, leaf and roots (Ashraf & Akhlaq, 2007) were applied which had detrimental effects on plant height.

Our findings also revealed that higher number of tillers and grains per spike were due to the least possible wheat and weeds competition in hand weeding plots. However, the likely reason for maximum numbers of tillers and grains when Sorghum, Sunflower and Congress grass extracts were applied could be the suppression of weeds, which minimized light, space and nutrients completion, secondly these plants water extracts might have had a stimulating effect on wheat development and hence wheat produced more tillers and grains. Our results are closely related with the findings of Majeed *et al.* (2012) who reported that lower concentration of *Chenopodium album* L. extract (25%) promoted number of tillers and grains. Similarly, Ashraf & Akhlaq (2007) observed that longer spikes and more grain per spike were found when combined application of Sorghum stem and root water extract was applied. Similarly, maximum 1000-grain weight was recorded in hand weeding,

Eucalyptus, Acacia and Sorghum water extracts where there was less competition between wheat and weeds. Our findings coincide with the results of Ashraf & Akhlaq (2007) who obtained heavier grain by the combined application of Sorghum stem and root water extract.

Crop yield in green plants depends upon their photosynthetic efficiency and conversion of light energy into chemical energy to organic matter (Reddy, 2004). Therefore, higher biological and grain yield might be due to minimum number of weeds and better wheat growth (taller plants, increased number of tillers, number of grains per spike, 1000-grain weight and harvest index), which collectively enhanced dry matter accumulation. On the other hand, weeds also caused less completion for plant nutrients, space and sunlight where their population was reduced by hand weeding or by the application of potential allelopathic chemicals in plant water extracts. Moreover, where the plant water extracts did not control weeds the grain yield and yield components reduced due to competition for resources. Our results showed that wheat grain yield was increased up to 48% (hand weeding), 44% (Congress grass), 43% (Sorghum), 42% (Sunflower), 26% (Acacia), 25% (Eucalyptus), 18% (Shishum), 13% (Poplar) and 11% (Tobacco) compared to control treatment. Ashraf & Akhlaq (2007) obtained 12% higher grain yield compared to control by the application of Sorghum roots water extract and 20% higher yield by the combined application of Sorghum stem, leaf and root water extract. Similarly, Awan *et al.* (2012) obtained higher grain yield in hand weeding and lowest in control, however, combined application of Sorghum, Sunflower and *Brassica* extracts increased wheat biometry and yield.

Conclusion

From present study it can be concluded that allelopathic chemicals in leaf water extracts of Eucalyptus, Acacia, Sorghum, Shishum, Sunflower, Poplar, Tobacco and Congress grass significantly suppressed weeds by reducing weed density, fresh and dry weed biomass, and encouraged wheat (cv. Hasham-8) growth and yield parameters such as days to 50% heading, plant height, tillers m^{-2}, grain $spike^{-1}$, 1000-gain weight, biological and grain yield. Although hand weeding treatment produced minimum fresh and dry weed biomass and highest wheat grain yield which was closely followed by leaf water extract of Sorghum, Sunflower and Congress grass treatments as compared to control. Therefore, it is recommended that leaf water extracts of Sorghum, Sunflower and Congress grass can be practiced safely twice (30 and 60 DAS) during the growing season to suppress weeds density, fresh and dry weed biomass and to enhance wheat grain yield.

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