



THE EFFECT OF SEED PEELS OF *NIGELLA SATIVA* L. AND *BRASSICA NIGRA* ON GROWTH OF CHICKPEA (*CICER ARIETINUM*)

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Abstract

The experiment was carried out the study of effect of seed peels of *Nigella sativa* and *Brassica nigra* by 5, 10 mg/ kg soil that added them to soil alone and 5, 10 mg/kg soil together on the growth of *Cicer arietinum* plants.

The results showed the increased significantly germination accelerator, plant height, leaves number, branches number, flowers number, legumes number, seed dry mater, carbohydrate and protein percentage in seeds.

Keywords : *Nigella sativa*, *Brassica nigra*, *Cicer arietinum*, seed peels.

Introduction

Chick pea *Cicer arietinum* L. belongs to Fabaceae family, an important economic plant fixation to nitrogen (Townsend and Guest, 1974). Black cumins (*Nigella sativa*) belongs to Ranunculaceae family added to food types such as bread and pickles (Hajhashem *et al*, 2004), black cumins seeds contain fixed oil, sterols, vitamin A, B, E, carotene and minerals such as phosphorus, iron and calcium (Khalifa, 2011). Mustard (*Brassuca nigra*) belongs to Brassicaceae family (Townsend and Guest, 1974) contains protein, sinapine, myrosinase enzyme, mucilage and B1-Acid phytinique (Tlass, 2008). The current study aims to determine the effect of the remnants of black cumins seeds and black mustard when used as soil fertilizer in the growth and yield of the chickpea plant.

Materials and Methods

The experiment was conducted in the winter growth season 2017-2018 in the botanical garden of the Department of Biology in the College Education for Pure Sciences (Ibn Al-Haitham), University of Baghdad, chickpea seeds were grown in pots capacity 4 kg on 30/11/2017 and the following treatments from the remnants of black cumins seeds and black mustard resulting from oil removal from both of them with a cold press machine mini (oil press machine) by Dr. Issra A. Jibra and the treatments were as follows:

1. Control (without adding)
2. Soil added to 5 gm per kg of black cumins seed residue.
3. Soil added to 10 gm per kg of black cumins seed residue.
4. Soil added to 5 gm per kg of black mustard seed residue.
5. Soil added to 10 gm per kg of black mustard seed residue.
6. Soil added to a mixture of 5 gm per kg of black cumins seed and black mustard residues.

The following vegetative characteristics were measured on 17 January 2018:

1. Germination speed =(germination seed number) /(total seed number) × 100 (Al-Kaisi *et al.*, 2011)
2. Plant height cm: Measured from the area of contact of the plant with the soil to the end of the second apex of the mean stem.
3. Number of leaves per plant

4. Number of branches per plant

The plants were harvested on 28 March 2018 and the following characteristics were measured:

1. Plant cm height
2. Number of leaves per plant
3. Number of branches per plant
4. Number of flowers per plant
5. Number of pods per plant
6. The weight of the pods (gm)
7. The length of the pods (cm)
8. The weight of the seeds in the pods (gm)
9. Number of seeds per pods
10. Mean seed weight per plant
11. Percentage of carbohydrates: The standard curve was prepared to determine the color ratio by measuring photodensity by spectrophotometer at 488 nm wavelength and then draw the standard curve of the relationship between concentration and photodensity reading (Al-Kaisi *et al.*, 2009). The percentage of carbohydrates in seeds was estimated by Herbert *et al.* (1974) method.
12. The percentage of seed protein was estimated using micro kjeldahl after digesting a known weight of seeds and the protein was calculated according to the following formula:

Protein = %N × 6.25 (Vopyan, 1984; Al-Saedi *et al.*, 2016)

Statistical analysis was conducted by SAS (2010) and treatments mean were compared using the Lowest significant difference LSD test at a probability level of 0.05.

Results and Discussion

The results of the table (1) showed the existence of significant differences between all treatments in the characteristic of the speed of germination when adding 5 and 10 gm of black cumins and mustard seeds residues alone or both compared to the treatment of control, as for the characteristic of the height of the plant in the first cutting it was found that there are significant differences of treatments in this characteristic and the increase was 43.81% and

29.26% when adding 5 and 10 gm of black cumins seed residues to the soil in respectively and when adding 5 and 10 gm of mustard seed residues increased by 29.26% and 75.67% respectively. As for the addition of 5 gm for both the remnants of black cumins seeds and mustard residues, an increase of 121.87% compared to the control treatment, when studying the characteristics of the number of leaves increased by (50.15, 333.50, 383.50, 616.50, 700.00) for difference transactions 5 and 10 for each black cumins seeds and mustard residues or both compared to control when examined the characteristics of the number of branches of the same table. The significant differences were observed for the treatment of 10 gm of black cumins seeds residues and 5 gm of both the black cumins and mustard seeds residues treatments by 47.19% and 74.90% respectively compared to the control treatments, while the remaining treatments were non-significantly.

Table (2) indicates in the study of the characteristic of the height of the plant at the harvest and found significant differences in treatments where the treatment of 5 gm of black cumins seeds residue increased by 14.07% while the treatment of 10 gm did not record significant differences, but for the treatment of 5 and 10 gm of mustard residue increased by 22.8 and 36.23% respectively. As for the treatment of 5 gm for each of the seed residues increased by 37.56% compared to the control treatment, but when studying the number of leaves, it was found significant differences between treatments, it increased significantly by 1.51 and 3.19% for the treatment of 5 and 10 gm when the black cumins seeds residue was added to the soil and increased for the same two concentrations of mustard seed residues increased by 11.27% and 14.51% respectively, while when adding 5 gm for each of black cumins seed and mustard, it increased by 46.73% compared to control plants.

The results of the same table indicate that there are significant differences between treatments in the characteristic of the number of branches per plant, increased by 87.26% to concentration 5 gm of black cumins seed and 74.90% to concentrate 10 gm of the same treatment, but for concentrations of 5 and 10 gm of mustard seed residue increased by 99.62 and 149.81% and when adding 5 gm for each of the remnants of black cumins seeds and mustard increased by 149.81% compared to the treatment of control and, when studying the number of flowers per plant it was found that there are significant differences in the treatments of 5 gm of the seeds of black cumins seeds, but the concentration of 10 gm increased by 43.41% for the concentrations of 5 and 10 gm of mustard seeds residue increased by 30.37% and 139.11% respectively.

When adding 5 gm each of the two plant seed residues, it was 139.11% compared to the control treatment. The results of the same table indicate that there are significant differences in the number of pods per plant, increased by 50.15 and 60.06% for 5 and 10 gm of black cumins seed residues, 60.18 and 110.21% for mustard seed residues for the same two concentrations, but when using 5 gm for each of the remains of the two plants, the ratio was 210.21% compared to the control plants.

Table (3) indicates that there are significant differences between treatments in the characteristic of the weight of the pod increased by 123.65 and 184.61% for the treatment of black cumins seeds respectively and increased by 311.53 and

307.69% for the treatment of mustard residues respectively, as for the treatment of the mixture of residues of black cumins seeds and mustard the increase was 573.07% compared to the control plants. As for the characteristic of the length of the pod, the treatments increased compared to the control plants, the increase was 6.53 and 6.93% for the treatment of the residues of the black cumins seeds plant and the increase of 14.11 and 14.91% for mustard seed residues, and for the residues of the seeds of black cumins seeds and mustard, the increase was 19.35%.

The results of the same table show that there are significant differences between some treatments in the characteristic of seed weight in pod, the increase was 14.30% of the treatment containing 10 gm of black cumins seed residues and the increase was 19.29% in the treatment of 5 gm mustard residues as for the treatment of the mixture of black cumins seed residues the increase was 33.33% compared to the control plants, while the treatment of each of the 5 gm of black cumins seeds residue and 10 gm of mustard residue were both non- significant. As for the number of seeds per pod, all treatments were non- significant compared to control plants.

The results of the table (4) indicate that there are significant differences in the characteristic of the mean weight of the seed, the treatment of the remains of black cumins seeds increased by 32.25 and 103.22% and increased in the treatment of mustard plant by 58.06 and 54.83% respectively and to the treatment of the residues of black cumins seeds and mustard and the increase of 83.87% compared to plants control. As for the percentage of carbohydrates, the percentage of black cumins seeds residues increased by 42.77 and 52.22% and for mustard residues increased by 53.88% and 45.77% respectively, and for black cumins seeds and mustard treatments increased by 72.88% compared to the control plants. In the same table, it was noted that there were significant differences in the characteristic of the percentage of protein seeds, the increase was 32.82 and 46.01% for the treatment of black cumins seed residues, 58.43 and 42.17% of mustard seed residues respectively, while the treatment of black cumins seed residues and mustard was 57.51% compared to the control plants.

That all the vegetative and physiological characteristics studied have increased except the number of seeds per pod in the treatment that were mixed with the soil of the residues of the black cumins plant and mustard and the absence of a previous study of the remnants of plant seeds on the two plants it was found that the remnants of the seeds of the black cumins of fixed oils as well as sterols, saponins and elements such as phosphorus, iron and calcium (Atta-ur-Rahman *et al*, 1995). The seed residues contain some essential fatty acids and antioxidants such as nigellone, glutathione and arginine amino acid (Abdulelah and Zainal-Abidin, 2007).

All the seeds contain these substances as well as the elements establish a plant well absorbed by the roots and the transfer of important compounds to stems and leaves and allows for photosynthesis and accumulation of organic matter that contributes to plant growth (Tlass, 2008; Khalifa, 2011). The presence of arginine in the residue of seeds, which is the source of nitrogen for the plant and amino acids are very important in the plant (Young and Gao, 2007) and that the

fats contained in the seeds have an important property which is antimicrobial and anti-tumor and also contains phenolics and quinones substances obtained Super critical carbon (Tiruppur Venkatachallam *et al.*, 2010).

Black mustard seeds contain essential substances such as carbohydrates, amino acids and organic acids, as well as by-products such as flavonoids, sterol, phenolic acid, alkaloids and glucosinolates (Tlass, 2008; Halkier and Gershenzon, 2006), and sinigrin in mustard seeds range from between 34.65-16.42 gm/ml.

The contents of the seed residues worked to increase the number of branches and the number of leaves and the number of flowers and this reason an increase in the number of pods and the mean weight of the seed and the percentage of carbohydrates and protein in the seeds (Prasad *et al.*, 2015) so we conclude from the above that the remnants of seeds after extracting fat from them can be mixed with the soil and added as fertilizer to improve the vegetative and physiological characteristics of the plant.

Table 1 : The effect of the residue of black cumins and mustard seeds added to the soil in the speed of germination, the height of the plant, the number of leaves and the number of branches in the first cutting of the chickpea plant.

Treatment	Speed of germination	Height of the plant (cm)	Number of leaves per plant	Number of branches per plant
Control	0.41	13.67	2.00	2.67
Black cumins 5 gm	0.86	19.67	3.11	3.87
Black cumins 10 gm	0.58	17.67	8.67	3.93
Mustard 5 gm	0.81	17.67	9.67	3.67
Mustard 10 gm	0.86	23.67	14.33	3.67
Mixture of 5 gm black cumins+ mustard	1.11	30.33	16.00	4.67
LSD	0.36	1.39	1.04	1.08

Table 2: The effect of the residue of black cumins and mustard seeds added to the soil on the height of the plant, the number of leaves, the number of branches, the number of flowers and the number of pods at the harvest of chickpeas plant.

Treatment	Height of the plant (cm)	Number of leaves per plant	Number of branches per plant	Number of flowers per plant	Number of pods per plant
Control	49.67	20.67	2.67	7.67	3.33
Black cumins 5 gm	56.67	21.00	5.00	7.00	5.00
Black cumins 10 gm	48.67	21.33	4.67	11.00	5.33
Mustard 5 gm	66.38	23.00	5.33	10.00	6.00
Mustard 10 gm	67.67	23.67	6.67	10.67	7.00
Mixture of 5 gm black cumins+ mustard	68.33	30.33	6.67	18.00	10.33
LSD	2.87	1.84	1.32	1.36	1.43

Table 3: The effect of the residue of black cumins and mustard seeds added to the soil on the weight of the pod, the length of the pod, the weight of the seeds in the pod and the number of seeds in the pod at the harvest of chickpeas plant.

Treatment	Weight of the pod	Length of the pod (cm)	Weight of the seeds in the pod	Number of seeds in the pod
Control	0.26	2.48	0.57	1.20
Black cumins 5 gm	0.56	2.89	0.58	1.27
Black cumins 10 gm	0.74	2.90	0.65	1.25
Mustard 5 gm	1.07	2.83	0.68	1.27
Mustard 10 gm	1.06	2.85	0.50	1.21
Mixture of 5 gm black cumins+ mustard	1.75	2.96	0.76	1.31
LSD	0.11	0.41	0.10	N.S

Table 4: The effect of the residue of black cumins and mustard seeds added to the soil on the mean seed weight, percentage of carbohydrates and percentage of protein in the seed at the harvest of chickpeas plant.

Treatment	Mean seed weight (gm)	Percentage of carbohydrates in seeds	Percentage of protein in seed
Control	0.31	9.00	6.52
Black cumins 5 gm	0.46	12.85	8.66
Black cumins 10 gm	0.63	13.70	9.52
Mustard 5 gm	0.49	13.85	10.33
Mustard 10 gm	0.48	13.12	9.27
Mixture of 5 gm black cumins+ mustard	0.57	15.56	10.27
LSD	0.09	3.71	2.12

Conclusion

The possibility of using seed peels of *Nigella sativa* L. and *Brassica nigra* as a fertilizer for the soil as a substitute for chemical fertilizer.

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