

Original Research Article

Effect of onion and garlic biowaste on germination and growth of microgreens

Madhuri Patil*, Pooja Jana, Chandrashekhar Murumkar

Department of Botany, Tuljaram Chaturchand College, Baramati, Maharashtra, India

Received: 19 March 2021

Accepted: 10 May 2021

*Correspondence:

Dr. Madhuri Patil,

E-mail: patilmadhuri352@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Biowaste of onion and garlic peel is remaining unexploited for their sustainable use having potential as source of organic fertilizer. The present work was intended to investigate biowaste of onion and garlic peel water extract on germination and growth of fenugreek, mustard, falooda and garden cress seeds which could resource as microgreens

Methods: Germination studies in selected seeds are carried out by water extracts of onion and garlic peel.

Results: As far as growth is concerned variation is observed in all seeds. Significant escalated results were observed in garlic peel extract on fenugreek seeds as compared to other seeds. However, after treatment of onion extract moderate enhancement in growth observed in falooda and garden cress seeds. It is observed that there is no significant influence of treatment on germination of all seeds.

Conclusions: Onion and garlic peels biowaste can be used as a natural growth enhancer in a sustainable way for growing microgreens of fenugreek and falooda seeds whereas onion and garlic peel extracts could inhibit the growth of Mustard and garden cress seeds.

Keywords: Biowaste, Microgreens, Peel, Nutrient, Garden cress

INTRODUCTION

Onion and garlic peels are good organic fertilizers rich in calcium, iron magnesium and copper many of times not properly utilized in bio-waste disposal. Onion (*Allium cepa*) is mostly cultivated species all over the India. Onion bulb is the plant portion mostly used for cooking and aroma for varieties of dishes it gives flavor to most of the dishes.¹ Onion are important source of several phytonutrients as flavonoids, fructooligosaccharides, thiosulfates and other sulphur compounds.^{2,3} Onion it is responsible for the odour and flavour because of sulphur compounds and has active anti-microbial agents.⁴ Garlic (*Allium sativum*) peel is good nutrient source for the plant growth. They have good source of vitamin, antioxidants and nutritional value like fiber, calcium, calories, iron, potassium and magnesium.

Fenugreek (*Trigonella foenum-graceium*), garden cress (*Lepidium sativum*), falooda (*Ocimum basilicum*) and black mustard (*Brassica nigra*) were used for test utilization. Those seeds are known for the medical uses and spices in ancient medicine. Fenugreek seed used as a spices and medicinal treatment such as hypocholes, terolemic, lactation aid, antibacterial, gastric stimulant, for anorexia, antidiabetic agent galactagogue, hepatoprotective effect and anticancer.⁵ Falooda seed promotes health, blood sugar, seeds of basil have been used as traditional medicine treatment of dyspsia, ulcer, diarrhea, and other illness.⁶ Mustard seeds are used for treatment of inflammatory condition, cancer and cardiovascular disease. Whereas garden cress seeds used in food, cooking remedy to treat health problems used in healing fracture, accidental injuries. Mineral profile of garden cress seed shows high content of potassium and



low content sodium in all fraction which make beneficial for the patient of high blood pressure and also can be recommended to athlete.⁷

Now a day, people grow small sprout like plant at home or in kitchen garden they are known as microgreens. They are basically small healthy nutritional herbs grown out from the edible seeds that can easily grow through organic way at home with low-cost equipment and in few days (7-21) at home. Microgreen's stem and leaf are considered as edible and used in food for nutritional diet and excellent towards health.

Microgreens of mustard seeds are good for health have several vitamin, dense calcium, protein, iron, fibre and stronger immune system and healthy hair growth. A fenugreek seeds microgreen is use in spices to give texture to food rich in vitamin use in salads, as dip and helps to weight loss. Garden cress and falooda seeds microgreens are fast growing herb it is healthy for the human diet so now a days mostly people prefer microgreens for their health to get better nutrition.

In present work efforts have been made to use biowaste water extracts of dried onion and garlic peels as natural growth promoter to grow microgreens of fenugreek, black mustard, falooda and garden cress seeds in cost effective way for environment friendly biowaste disposal.

METHODS

The kitchen waste obtained from onion and garlic peels. About 10-gram dried peel of both materials were soaked overnight in 100 ml water. This filtered extract was preserved at 4°C and used as prospective medium for seed germination studies. The soils were collected from the garden and brought to laboratory. It is sieved in 3mm sieve to remove the rock, unnecessary particles, and pebbles from the soil. Further soil was distributed in the bowl of diameter 8.5 cm each containing 0.136 gm soil. The whole experiment was set up into culture room with optimum conditions of temp 25±2°C and good light intensity along with 12 h photoperiod and 80 % relative humidity. All the healthy taste seeds of fenugreek, mustard, falooda and garden cress were washed thoroughly with distilled water and in each bowl 10 seeds were sown and treated with 1% onion and

garlic peel extract at subsequent time intervals. The assessment including germination percentage and appearance of root and shoot length was carried out after 14 days. Control bowl was prepared without extract. The data are presented in the form of mean with standard deviation of 10 observations.

RESULTS

Treatment of fenugreek, falooda, mustard and garden cress seeds with 1% onion and garlic peel extract resulted in slight stimulation of germination (Figure 1). When compared control Fenugreek seeds showed 30% germination in onion extract whereas garlic extract does not affect on germination of Fenugreek seeds. Interestingly falooda seeds showed enhanced germination with garlic extract and negative impact by onion peel extract. A mustard and garden cress seed doesn't showed inhibition of seed germination by test extracts. Mustard seeds showed 10% and garden cress seeds 5% inhibition of germination when compared of control.

Table 1 and Figure 2 and 3 depicts growth pattern in test seeds using biowaste extracts of onion and garlic peel. One percent onion peel extracts showed significant stimulation in root and shoot length of falooda and garden cress seeds whereas slight increase in shoot length of garden cress seeds from 6.33 to 6.54 cm is observed. Fenugreek seeds remain unaltered by extract to onion whereas mustard seedling growth is interestingly inhibited by onion peel extract.

The maximum stimulative effect of 1% garlic peel extract is observed in both fenugreek root and shoots length. Root length is increased by 16% while shoot length increased in fenugreek seeds by 9% respectively remaining all the three seeds root and shoot length inhibited by garlic peel extract but significant inhibition was observed in shoot length of garden cress seeds up to 50%.

Onion peel extract found to be effective for germination of Fenugreek seeds while 1% garlic peel extract showed slight increase in falooda seeds from 50 to 55%. However, variation in growth pattern was observed in fenugreek seeds by garlic peel extract and basil seeds in onion extract. Mustard and garden cress seedlings are not altered by both the extract treatment.

Table 1: Effect of 1% onion and garlic peel extract on root and shoot length of fenugreek, mustard, falooda and garden cress seeds.

Parameter		Fenugreek	Mustard	Falooda	Garden cress
Control (cm)	Root length	0.20±0.00	2.96±2.63	8.02±1.06	6.04±0.83
	Shoot length	0.60±0.71	3.08±2.47	8.24±1.57	6.33±0.72
1% Onion peel extract (cm)	Root length	0.02±0.71	3.17±2.57	6.81±0.95	6.32±1.23
	Shoot length	0.05±0.71	3.08±2.50	7.02±1.64	6.54±1.29
1% Garlic peel extract (cm)	Root length	5.2±0.14	2.45±2.49	7.32±1.67	6.00±0.81
	Shoot length	5.4±0.07	2.33±2.69	7.53±1.83	3.22±0.74

All the observations are mean of 10 replications ± indicates standard deviation.



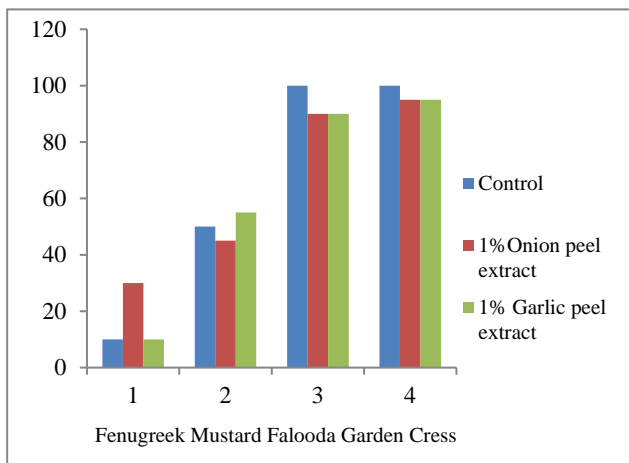


Figure 1: Effect of 1% onion and garlic peel extract on germination percentage of fenugreek, mustard, falooda and garden cress seeds.

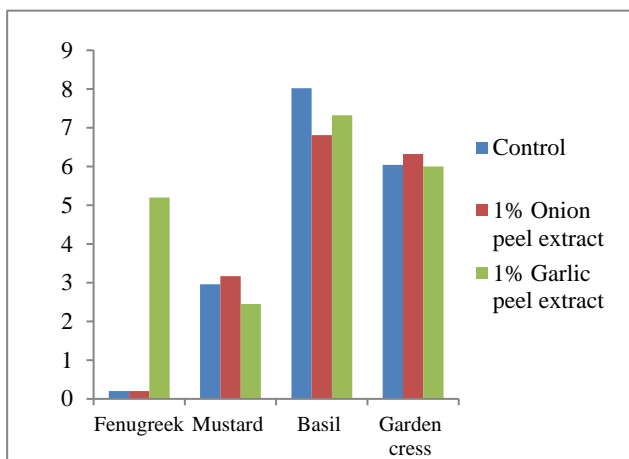


Figure 2: Effect of 1% onion and garlic peel extract on root length of fenugreek, mustard, falooda and garden cress seeds.

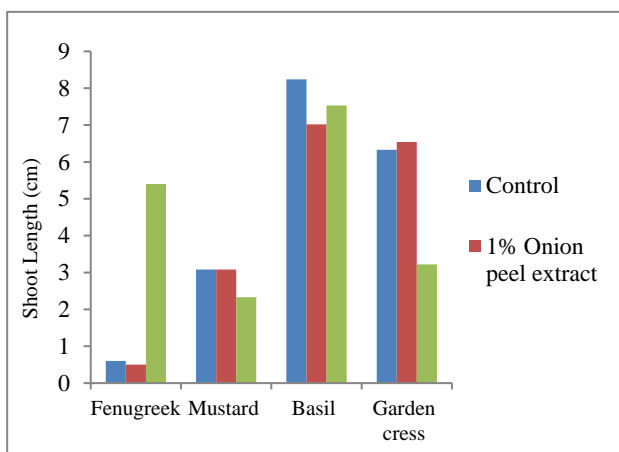


Figure 3: Effect of 1% onion and garlic peel extract on shoot length of fenugreek, mustard, falooda and garden cress seeds.

DISCUSSION

In the present work study, it was attempted to experimentally separate the effect of extract of onion and garlic peel on germination and seedling growth of Fenugreek, falooda, mustard and Garden cress seeds. Peel of onion showed significant enhanced growth in Fenugreek seeds. This could be as a result of they are rich in calcium, iron, magnesium and copper, potassium. Garlic is rich in complex organic sulphides and Onion is rich in carbohydrate flavonoid and phenol.⁸ The powder of fruit peel extracts in Fenugreek seeds as natural growth enhancer.⁹ Household waste discarded daily has a potential source of carbon, nitrogen, vitamins and amino acid which generally induce plant growth.¹⁰ The use of organic fertilizer is one of the common practice that can be alternative in agricultural system.¹¹

Both onion and garlic peel extracts showed inhibited rate of germination in mustard and garden cress which is further reflected in length of shoot and root. Combination of allelochemicals interfere with various physiological processes in the receiving plant shows typically inhibition effects.¹² Inhibition of germination is may be due to an allelopathic effect some flavonoids as they are capable of increasing the levels of reactive oxygen causing and also presence of different bioactive compounds like phenolics, flavonoids.^{13,14}

CONCLUSION

Results of present study suggest that seed germination of fenugreek and falooda is increased by onion and garlic peels respectively whereas mustard and garden cress seeds germination and growth is inhibited. It can be concluded that onion and garlic peel can be used to grow microgreens and also in field as intercrop for better growth of fenugreek and falooda. Bio waste of onion and garlic peel can be used in sustainable way for growing microgreens at home which are with aromatic flavor and concentrated nutrient content. In order to facilitate effectiveness of bio- fertilizer for growing microgreens further evaluation of nutritional analysis of microgreens is necessary as now a day chemical free organic supplements are of immense importance for health benefits.

ACKNOWLEDGEMENTS

Author would like to thanks to Principle, Tuljaram Chaturchand college, Baramati for continuous support during the work. Also grateful to head, department of botany, Tuljaram Chaturchand college, Baramati for providing laboratory facility.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee



REFERENCES

1. Ly TN, Hazama C, Shimoyamada M, Ando H, Kato K, Yamauchi R. Antioxidative compounds from the outer scale of onion. J agriculture Food chem. 2005;53:8183-9.
2. Slimestad RT, Fossen I, Vage M. Reviews Onions: a source of unique dietary flavonoids. J Agriculture Food Chem. 2007;55(25):10067-80.
3. Loredana L, Rosa C, Donatela A, Francesco R, Alessio C, Marisa Di M. Chemical Composition and Antioxidant properties of five white onion (*Allium cepa* L.) Landraces. J food quality, 2017;6873651:9.
4. Rose PM, Whiteman PK Moore, Zhu YZ. Bioactive S-alkenyl cysteine sulfoxide metabolites in the genus *Allium*; the chemistry of potential therapeutic agent. Natural product Rep. 2005;22(3)351-68.
5. Wani AS, Padyum K. Fenugreek a review on nutraceuticals properties and utilization in various food products. J Saudi Society Agri Sci. 2018;17:97-106.
6. Masooma M, Aqsa Q, Saeeda R, Nouman RS, Amer M, Naeem S et al. Nutritional Assessment of Basil Seed and its Utilization in Development of Value-Added Beverage. Pakistan J Agri Res. 2017.
7. Minaxi PR, Preeti DH. Therapeutic and nutritional importance of garden cress. J Pharmacognosy Phytochem. 2018;7(5):140-43.
8. Beatrice I, Ijsrm OT. Chemical Composition of Onion Peel (*Allium cepa*) and its Ability to serve as a Preservative in Cooked Beef. Int j sci Res Methodol Human J. 2017;7(4):25-34.
9. Mercy S, Mubsira Banu S, Jenifer. Application of Different fruit Peels Formulation as a Natural Fertilizer for Plant Growth. Int j sci technol res vol. 2014;3(1):21-5.
10. Mishra P, Koshy PE. Effect of vegetable and fruit waste on seed germination and growth of *Solanum lycopersicum*. Asian J Bio Sci. 2016;1:1-5.
11. Kanimozhi K, Pannerselvam A. Studies on molecular characterization of *Azospirillum* spp. Isolated from Thanjavur district. Int J Appl Biol Pharm Tech. 2010;1(3):1209-19.
12. Mominul IAKM, Sabina Y, Qasem JRS, Juraimi A, Md Parvez A. Allelopathy of medicinal plants: Current status and future prospects in weed management. Agri Sci. 2018;9:89-160.
13. Kumar D, Kumar N, Akamatsu K, Kusaka E, Harada H, Ito T. Synthesis and biological evaluation of indolyl chalcones as antitumor agents. Bioorg Med Chem Let. 2010;20:3916-9.
14. Radwan MA, Huda AA, Sahar KMK. Effect of *Calotropis procera* L. plant extract on seeds germination and the growth of microorganisms. Ann Agri Sci. 2019;64:183-7.

Cite this article as: Patil M, Jana P, Murumkar C. Effect of onion and garlic biowaste on germination and growth of microgreens. Int J Sci Rep 2021;7(6):302-5.



Principal
Tuljaram Chaturchand College
Baramati