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Extraction of Biological Essential Oil from Allium Sativum (Garlic) By Using Solvent Extraction Method and Study of their Seed Safety on Maize Crops

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Abstract
The Garlic and bio essential constituent of garlic are important in human being life directly or indirectly, it has several uses in benefits of human health as well as nutritional values. The study explores the extraction and extracts products constituents are responsible for activity against the bacteria and fungus. The Garlic contains sulphur base components most of are soluble in polar solvent and other are in non-polar solvent, hence simple, fast and reliable method i.e. The solvent extraction method is used for extraction. The extracted material that is liquid and solid powder checked with % of yield and physical properties like pH, Density etc. The extracted material applied on multiple seeds to checked against the seed safety the anti-fungal and seed born disease with evolution in laboratory using glass disc and germination paper.

Keywords: Essential constituent, Sulphur base compound, Solvent extraction, Antifungal, Seed born disease, Germination paper.

1.0 Introduction

The Allium sativum commonly named as garlic and it has variety of uses and its increases in spices of Indian kitchens, Several uses in pharmaceutical, dietary supplements and food processing industries. Some major uses of extracted bioactive material from Allium sativum shows potent antimicrobial activity against fighting with bacteria and viruses.[1] The garlic is rich of sulfurated compound containing variety of sulfides such as diallyl disulfide and dilly trisulfide.[2] The biological properties of garlic extracts mainly focuses on the significant influence of the optimization of extraction parameters and Different parameters influence such as quantity, quality, type, and biological properties of the extracted bioactive compounds from the plant material.[3] The oil extracted from garlic cloves using solvent extraction method is light yellow colour and show pungent smell.[4,15] The application of garlic oil is very specific due to its water

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solubility, High volatility and unpleasant odour, Garlic oil nano emulsion is covers to protect volatile components the efficacy of nano emulsion.[5]

2.0 Material and Methods

2.1 Experimental section

Preparation of garlic oil extract

Fresh garlic bulb of good quality having bulky cloves, collected from the domestic market of North Maharashtra region Taluka Taloda, District Nandurbar (It is radially available in all India region). The garlic cloves are separated and peeled out and gently wash with normal water and dried at room temperature for conditioning. [6,7] The Garlic paste prepare by using domestic kitchen mixture grinder and the mix it with solvent (Polar solvent – Methanol & Nonpolar solvent N – hexane) and kept it for soaking[8,9,10,11], Filtrate collected with removal of solid particulate matter, The recovery of solvent and bio essential material done on Rotary evaporator (make- Buchi Model R-300).[12,13] The process parameters of rotary evaporator are as Temperature of water bath is 70°C and Vacuum Pressure to collect expected material i.e. Garlic oil collected.[14]

Photograph 1 – Peeled garlic, garlic paste, separation funnel with solvent & Extracted oil

The subjected oil tested physical properties as density, moisture, pH and odour.

2.2 Physico-chemical testing of garlic oil

The physical properties of extracted garlic oil tested the Specific gravity of oil is found 1.0743 g/cc on Anton Park densitometer model no DMA 1001, whereas the water contain analysis found is 0.042 % w/w using KF reagent on karl fisher machine, The pH value of oil is 4.9.[16] The % yield calculated for biological essential oil extracted using polar solvent as methanol is 10.7%. The weight of oil measured against the starting material peeled garlic cloves the yield calculated using below formula [12,15]
Formula % yield calculated = (Weight of oil received ÷ Total weight of garlic cloves) X 100. [15]

3.0 Results

Herein, The current state of knowledge used for extraction and obtained good quality yield of garlic oil developed using solvent extraction methods, this is achieved by adapting and using simple domestic appliance to make process simplifier and then the Buchi Rota evaporator used with optimum temperature and reduced pressure for removal of excess amount of solvent to get Crystal clear garlic oil.[17] Activity checked of extracted garlic oil term as OG1 on multiple crops such as maize, Sorghum and soybean by using different doses as 2 ml, 5 ml & 8 ml applied on per kgs of seeds to evaluate the activity against fungi like Seed born fungus and Vigor growth of germination seeds.[18,19,20,21,26]

3.1Treatment details – Target crop maize

The method of seed treatment – We have taken extracted biomaterial OG1(Garlic oil) sample as per given doses with suitable polymer and water volume for better treatability. Then mix all together to get the homogenous mixture. Seed treated in standard seed treater.[20,21,22]

To check the disease and fungal growth activity at the interval of DAT and To check the growth activity at the interval DAT.

Table 1 -Treatment details

Treatment Name	Treatment code	Dose ml/kg/Fl oz/CWT	Specified for	Crop
T1	Untreated Seed		Seed treatment	
T2	OG1 + Polymer + Water	2 ml + 2m + 8 ml	Seed treatment	
T3	OG1 + Polymer + Water	5 ml + 2m + 8 ml	Seed treatment	
T4	OG1 + Polymer + Water	8 ml + 2m + 8 ml	Seed treatment	Corn

Table 2 - Observations taken in term of % germination, fungal growth activity and vigor growth activity.

Treatment No	Product	Dose	% of germination				Vigor Growth %	Fungal growth activity
			R1	R2	R3	Mean		
T1	Untreated Seed		95	92	93	93.33	7	Yes
T2	OG1 + Polymer + Water	2 ml + 2m + 8 ml	96	95	91	94.00	8	No
T3	OG1 + Polymer + Water	5 ml + 2m + 8 ml	96	92	90	92.67	6	No
T4	OG1 + Polymer + Water	8 ml + 2m + 8 ml	95	90	90	91.67	6	No

Photograph – 2 Observation of maize germinated seed after 7 days treatment.

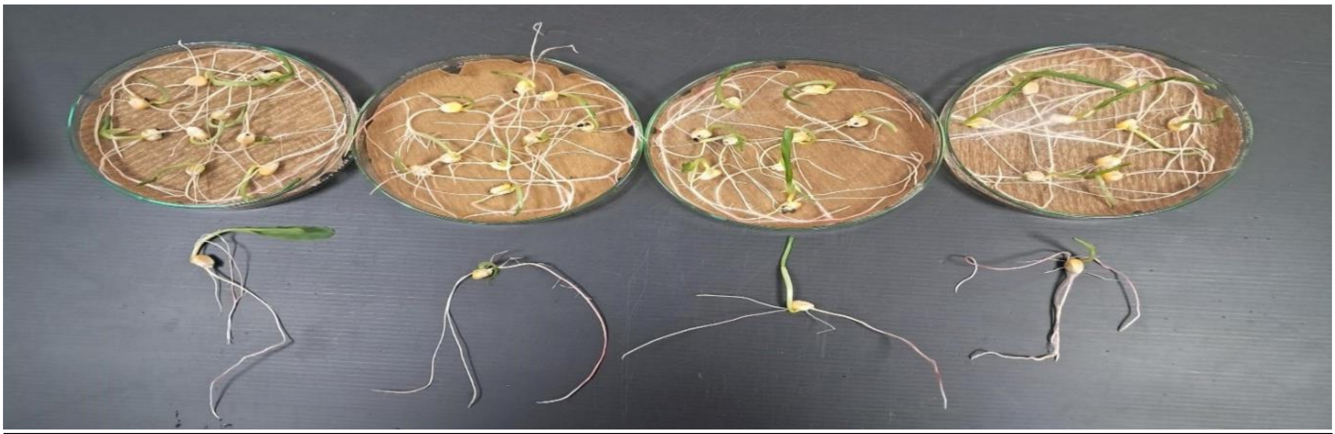
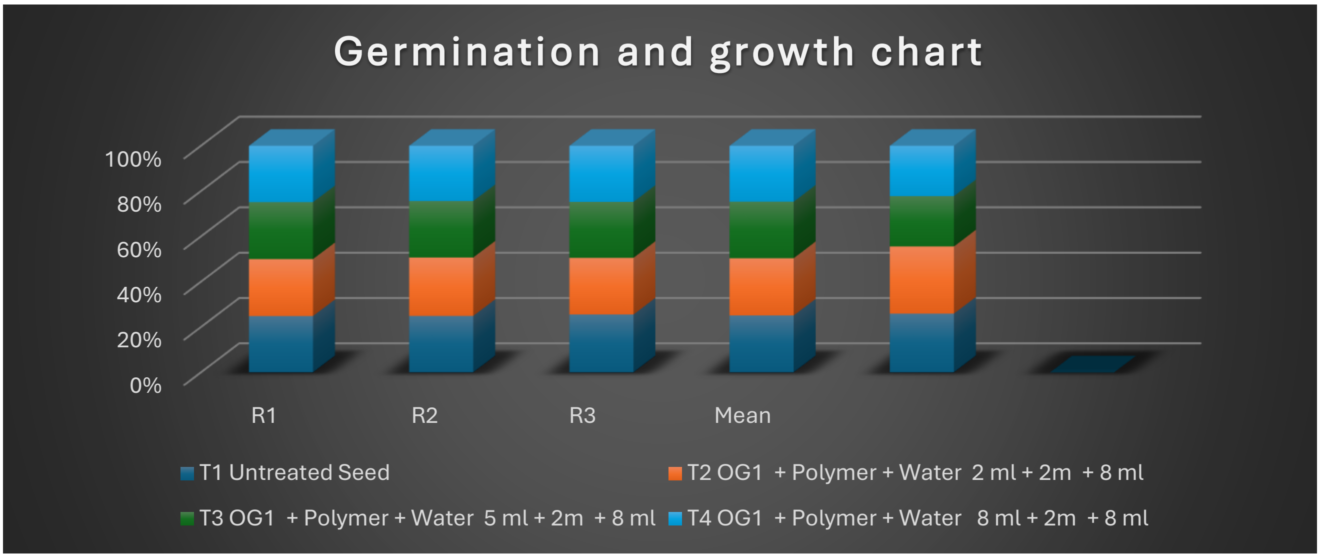


Table 3- Activity of garlic oil on Germination and Vigor growth.



4.0 Discussion

The finding on Maize as 2- and 5-ml application doses shows promising results compared to UTC and 8 ml application dose. In UTC we have observed lower growth and fungal growth activity whereas in application of 2 & 5-ml dose no fungal growth observed.

5.0 Conclusion

Garlic oil is easily extracted by solvent extraction method and has a good quality parameter proved by testing physical properties of oil. The garlic oil is useful for treatment of seed as a protectant and bio stimulant activity. The results of treated maize seed with garlic oil showed that T2 & T3 has promising results in term of germination performance, growth parameters and fungal growth activity as compared to untreated control. T4 has at par results with untreated control & In case of untreated control we observed slight lower growth and fungal growth activity.

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SOLVENT EXTRACTS OF GARLIC AGAINST NEW STRAINS OF PATHOGENIC BACTERIA : AN in vitro STUDY Department of Plant Biology and Biotechnology , (PG Biotechnology), Loyola College , Nungambakkam , PIN-600034 , Chennai (India) Department of Biotechnology , M . S . Ramaiah College of arts , science and commerce , PIN-560054 , Bengaluru (India) * Corresponding author email- armankhan0301@gmail.com International Journal of Applied Biology and Pharmaceutical Technology Available online at www.ijabpt.com Page : 316 MATERIALS AND METHODS Sample collection and isolation Biochemical and morphological characterization Genomic DNA isolation PCR amplification and sequencing Preparation of aqueous , ethanolic and methanolic extracts of Allium sativum International Journal of Applied Biology and Pharmaceutical Technology Available online at www.ijabpt.com Page : 317. 316–321.

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