AIRO JOURNALS
Peer Reviewed Multidisciplinary International

ISSN:2320-3714
Volume:2 Issue:3
June 2023
Impact Factor: 10.2
Subject: Chemistry

QUALITY AND PHYTOCHEMICAL CONTENT OF LEAFY MEDICINAL PLANTS IRRIGATED WITH DISTILLERY SPENTWASH

Dr. Rajveer Singh Sheoran
(Associate Professor)
Subject - Chemistry
SRR Morarka Govt PG college Jhunjhunu

Abstract

The development of a couple of medicinal plants with leaves was achieved using distillery spentwash in different weakening. These three sorts of spentwash — primary treated spentwash (PTSW), 50% spentwash, and 33 percent spentwash — were inspected to decide the plant supplements they contained, including nitrogen, phosphate, and potassium, as well as other physical and substance properties. An assessment of the synthetic and actual qualities of the trial soil was done. The pre-arranged ground was then irrigated with raw water (RW) and spentwash at a proportion of 50% and 33 percent. Seeds of leafy medicinal plants were established there. An examination was directed to decide the effect that spentwash has on the development of leafy medicinal plants at their unmistakable phases of development. It was found that the yields of all leafy medicinal plants were higher in water systems with a spentwash measure of 33% contrasted with water systems with raw water and 50% spentwash.

Keywords: *Leafy Medicinal Plants, Distillery Spentwash, Irrigation,*Phytochemical Content.

AIRO JOURNALS
Peer Reviewed Multidisciplinary International
ISSN:2320-3714
Volume:2 Issue:3
June 2023
Impact Factor: 10.2
Subject: Chemistry

1. INTRODUCTION

The irrigation of leafy medicinal plants with distillery spentwash, which is a residual liquid from the manufacturing of alcohol, presents a situation that has both positive and bad implications for agricultural approaches. spentwash is a residual liquid from the production of alcohol. Even though spentwash has the ability to provide benefits, such as increasing the fertility of the soil by adding nutrients that are necessary for plant growth, such as nitrogen, phosphorous, and potassium, it also presents hazards due to the significant amount of organic material that it contains and the presence of contaminants, such as heavy metals. It is conceivable for these parameters to have an influence on the biochemical composition of plants as well as the phytochemical content of plants. Both of these aspects are vital for the medicinal capacities of plants as well as the nutritional significance of plants.

It is necessary to have a complete grasp of the effects that spentwash irrigation has on leafy medicinal plants in order to ensure both the environmental sustainability of agriculture and the health of humans. For the purpose of striking a balance between the potential benefits and the environmental and health risks that need to be taken into consideration, it is vital to have this information.

1.1. Leafy medicinal plants

Leafy medicinal plants encompass a diverse array of botanical species valued globally for their therapeutic properties and nutritional benefits. These plants, characterized by their leafy foliage and rich phytochemical content, play pivotal roles in traditional medicine systems and modern pharmaceutical research. They are known for their ability to provide essential vitamins, minerals, and bioactive compounds that contribute to human health and well-being.

Peer Reviewed Multidisciplinary International
ISSN:2320-3714
Volume:2 Issue:3
June 2023
Impact Factor: 10.2
Subject: Chemistry

Figure 1: Leafy Medicinal Plants

Cultivating and studying leafy medicinal plants involve exploring their cultivation practices, biochemistry, and pharmacological potential. Understanding their intricate relationships with environmental factors, including irrigation methods such as distillery spentwash, is crucial for optimizing their growth conditions while ensuring the preservation of their medicinal qualities.

1.2.Understanding Distillery Spentwash in Leafy Medicinal Plant Irrigation

Distillery spentwash, rich in organic materials and trace elements, can be used to irrigate green medicinal plants. It manages waste and sustainably fertilizes soil, improving soil fertility, plant development, and crop yields. However, its high biochemical oxygen demand and potential pollutants pose environmental and health risks. Understanding its effects on the soil-plant system is crucial, especially for leafy medicinal plants with therapeutic properties. Research is needed to understand its impact on plant quality, safety, and phytochemical composition. Implementing spentwash irrigation in sustainable agricultural practices can conserve the environment and produce high-quality medicinal plants.

2. LITERATURE REVIEW

Ahn (2017)examines global botanical drug trends and development strategies. He stresses that botanical medications, made from plants, have many therapeutic effects that have been recognised throughout cultures and traditional medicinal systems. Due to concerns about synthetic drug side effects, consumers are demanding more natural and plant-based solutions, according to the survey. Ahn highlights regulatory and scientific barriers in standardizing botanical medications for

ISSN:2320-3714
Volume:2 Issue:3
June 2023
Impact Factor: 10.2
Subject: Chemistry

worldwide markets. Advanced biotechnology approaches and thorough clinical studies may help plant medications gain general acceptability. This study traces the evolution of botanical medications and emphasises the need for strong regulatory frameworks to assure their safety and efficacy.

Amar, Ashish, and Sivakoti Ramana (2003) They examined the environmental and agricultural effects of distillery effluent, or spentwash, in the Journal of Plant Nutrition and Soil Science. Their research examines how distillery effluent affects groundnut crop enzymatic activities. The data show that distillery effluent considerably changes soil enzymatic activity, which are essential for nutrient cycling and fertility. The study also finds that effluent irrigation alters soil chemistry, affecting groundnut quality. This research shows that industrial effluents can boost crop yields and offer nutrients, but they can also degrade and contaminate soil. Thus, the study recommends managing and treating distillery effluents before using them in agriculture to reduce environmental damage.

Basavaraju and Chandraju (2008) Study the effects of distillery spentwash on leafy plants in agriculture. Their study in the Asian Journal of Chemistry examines how spentwash irrigation impacts leafy produce nutritional profiles. The findings suggest that spentwash may boost these veggies' nutrient content and yield. The study also shows that some vegetable species benefit from the nutrient-rich wastewater, while others may suffer from the high organic load and associated pollutants. This research highlights the necessity for species-specific guidelines to optimise spentwash use in vegetable growing to ensure benefits outweigh dangers. It also proposes studying spentwash irrigation's long-term and cumulative effects on soil health and crop quality.

Chandraju, Basavaraju, and Chidankumar (2008) Research examines how distillery spentwash irrigation affects green vegetables. They study green crop growth, yield, and nutrient dynamics under spentwash irrigation. The study reveals that spentwash can boost growth and yields as a fertiliser supplement, but improper management can pollute soil and water. The study emphasises controlled application rates and soil monitoring to prevent toxic accumulation. This study helps distilleries manage waste sustainably by revealing how industrial effluents can be used for agriculture. It also emphasises integrated waste management that balances environmental safety and agricultural output.

Chandraju, Nagendra Swamy, (2010) In Natural Environment and Pollution Technology, they examine how distillery spentwash irrigation affects ginger and turmeric nutrients. Ginger (Zingiber officinale) and turmeric (Curcuma longa), two medicinal plants, are studied to see how spentwash irrigation affects their growth and nutrient intake. The findings imply that spentwash can boost plant growth and nutrient content in normal and treated soils. The study warns against soil salinity and heavy metal accumulation, which could decrease plant health and soil quality over time. This research on sustainable farming practise using industrial by-products is very useful for medicinal plant growing zones. It emphasises the necessity for comprehensive management measures to balance spentwash irrigation advantages and environmental hazards.

3. MATERIALS AND METHODS

In order to conduct an investigation of the physicochemical properties, as well as the quantities of (N), (K), (P), and (S) that were discovered in the primary treated diluted spentwash at 50% and 33% respectively, standard processes were utilised. This analysis was carried out in order to measure the levels of these elements. It was decided to use a dilution of the PTSW that was either 33 percent or 50 percent for the purpose of irrigation. Before the application of spentwash irrigation, a composite soil sample was taken at a depth of 25 cm as a preliminary step.

After being air-dried, the sample was powdered, and then its physicochemical properties were evaluated using this process. There were four leafy medicinal plants that were selected for this particular experiment.

The seeds were planted and watered with raw water (RW), which comprised of 50% and 33 percent southwestern water. The rest half of the period was irrigated with raw water utilizing a measurement of five to ten millimeters for each square centimeter, contingent upon the climatic conditions. The measurements was directed two times per week. On three separate occasions, tests were conducted, and once the plants had achieved their full maturity, they were harvested. The average weight of the plants was used to determine the yields, which were then recorded.

ISSN:2320-3714
Volume:2 Issue:3
June 2023
Impact Factor: 10.2
Subject: Chemistry

4. RESULTS AND DISCUSSION

The chemical composition of PTSW, half, and one-third SW was analyzed, and the findings are presented in Table 1. The parameters examined include pH, electrical conductivity, total solids (TS), total dissolved solids (TDS), total suspended solids (TSS), settleable solids (SS), chemical oxygen demand (COD), biochemical oxygen demand (BOD), carbonates, bicarbonates, total phosphorus, total potassium, ammonium nitrogen, calcium, magnesium, sulfur, sodium, chlorides, iron, manganese, zinc, copper, cadmium, lead, chromium, and nickel.

Table 1: Chemical characteristics of distillery spentwash

CHEMICAL PARAMETERS	PTSW	50% PTSW	33% PTSW
pH	8.68	8.74	8.76
Electrical conductivitya	37511	28371	8731
Total solids[b]	58311	38341	32041
Total dissolved solids[b]	48211	29111	23191
Total suspended solids[b]	21351	6491	5191
Settleable solids[b]	19991	5261	3931
COD[b]	52361	20147	21059
BOD[b]	27211	8829	5811
Carbonate[b]	Nil	Nil	Nil
Bicarbonate[b]	23311	7611	4411
Total phosphorous[b]	51.6	33.55	28.14
Total potassium[b]	8611	5111	3811
Calcium[b]	0111	601	481
Magnesium[b]	2355.27	587.27	245.33
Sulphur[b]	81	41.3	28.9
Sodium[b]	631	411	391
Chlorides[b]	7315	4623	4515
Iron[b]	8.6	5.8	4.6
Manganese[b]	0911	506	399
Zinc[b]	2.6	1.05	0.74
Copper[b]	0.36	0.219	0.159
Cadmium[b]	0.116	0.114	0.113
Lead[b]	0.27	0.101	0.171
Chromium[b]	0.16	0.137	0.123
Nickel[b]	0.110	0.156	0.136
Ammonical nitrogen[b]	861.9	463.47	394.87
Carbohydrates[c]	33.9	22.67	9.23

There are various attributes of the exploratory soils that are recorded in Table 2. These attributes incorporate the pH, the electrical conductivity, how much natural carbon, the accessible nitrogen, phosphorus, potassium, sulfur, interchangeable calcium, magnesium, sodium, DTPA iron, manganese, copper, and zinc components.

Table 2: Features of the test soil

PARAMETERS	VALUES
Coarse sand[c]	0.96
Fine sand[c]	51.83
Silt[c]	36.88
Clay[c]	34.77
pH (1:2 soln)	9.52
Electrical conductivity[a]	651
Organic carbon[c]	2.88
Available Nitrogen[b]	513
Available Phosphorous[b]	313
Available Potassium[b]	224
Exchangeable Calcium[b]	296
Exchangeable Magnesium[b]	387
Exchangeable Sodium[b]	226
Available Sulphur[b]	448
DTPA Iron[b]	313
DTPA Manganese[b]	321
DTPA Copper[b]	23
DTPA Zinc[b]	71

It has been resolved that the organization of the dirt is reasonable for the development of plants since it fulfills the requirements that are all necessary for the development of plants. The yields were incredibly high for all assortments of leafy medicinal plants when they were irrigated with a 33% SW water system, moderate when they were irrigated with a half SW water system, and very low when they were irrigated with a RW water system.

ISSN:2320-3714
Volume:2 Issue:3
June 2023
Impact Factor: 10.2
Subject: Chemistry

In earlier research conducted by the authors, it was discovered that irrigation with a 33% SW ratio is beneficial to the growth, yield, and nutrients offered by plants. There is a possibility that this is because plants are able to absorb the greatest amount of NPK at greater dilutions (33 percent).

It is possible that the more acidic person of the dirt results in lower yields when half SW water system is utilized, rather than 33% SW water system. Then again, the rate yield is most elevated on account of coriander (Coriandrum sativum), and it is least on account of spearmint (Mentha viridis).

Table 3: Features of the experimental soil (after the harvest of medicinal leafy plants)

PARAMETERS	VALUES
Coarse sand[c]	10.70
Fine sand[c]	52.24
Siltc	36.06
Clay[c]	35.37
pH (1:2 soln)	9.38
Electrical conductivity[a]	655
Organic carbon[c]	2.09
Available Nitrogen[b]	545
Available Phosphorous[b]	329
Available Potassium[b]	236
Exchangeable Calcium[b]	296
Exchangeable Magnesium[b]	387
Exchangeable Sodium[b]	226
Available Sulphur[b]	448
DTPA Iron[b]	323
DTPA Manganese[b]	321
DTPA Copper[b]	23
DTPA Zinc[b]	71

An examination of the dirt was performed after the reap of vegetables, and the results show that there is an expansion in how much plant nutrients in the dirt, while there is no adverse consequence on any of different boundaries (Table 3).

5. CONCLUSION

At the point when it came to the leafy medicinal plants, it was all seen that the yield was at its most elevated on account of 33% water system, moderate in half SW water system, and least in leftover water system. The plants had the option to gather the most extreme amount of nutrients, both from the dirt and the spentwash, which brought about major areas of strength. This was accomplished through irrigation with a 33% SW ratio. The conclusion that can be drawn from this is that the SW can be utilised in a practical manner for the production of leafy medicinal plants without the use of any external fertilisers, whether they be organic or inorganic. This reduces the amount of money that is spent on cultivation, which in turn boosts the farmers' economic situation.

REFERENCES

1. *Ahn, K. (2017). The worldwide trend of using botanical drugs and strategies for developing global drugs. BMB Reports, 50(3), 111-116.*

2. *Amar, B. S., Ashish, K. B., & Sivakoti Ramana. (2003). Effect of distillery effluent on plant and soil enzymatic activities and ground nut quality. Journal of Plant Nutrition and Soil Science, 166(3), 345-347.*

3. *Basavaraju, H. C., & Chandraju, S. (2008). Impact of distillery spentwash on the nutrients of leafy vegetables: An investigation. Asian Journal of Chemistry, 20(7), 5301-5310.*

4. *Chandraju, S., Basavaraju, H. C., & Chidankumar, C. S. (2008). Investigation of impact of irrigation of distillery spentwash on the growth, yield and nutrients of leafy vegetable. Chemical and Environmental Research, 17(1-2).*

5. *Chandraju, S., Nagendra Swamy, R., Chidankumar, C. S., & Girija Nagendraswamy. (2010). Influence of distillery spentwash irrigation on the nutrients of Ginger (Zingerber*

officinale) and Turmeric (Curcuma longa) in normal and spentwash treated soil. Natural Environment and Pollution Technology.

6. *Collins, M. (2000). Medieval herbals: The illustrative traditions. University of Toronto Press.*

7. *Gershenzon, J., & Ullah, C. (2022). Plants protect themselves from herbivores by optimizing the distribution of chemical defenses. Proceedings of the National Academy of Sciences, 119(4). https://doi.org/10.1073/pnas.2120277119*

8. *Kaushik, K., Nisha, R., Jagjeeta, K., & Kaushik, C. P. (2005). Impact of long and short term irrigation of a sodic soil with distillery effluent in combination with bio-amendments. Bioresource Technology, 96, 1860-1866.*

9. *Kuntal, M. H., Ashish, K. B., Kalikinkar, B., & Misra, K. (2004). Effect of post-methanation effluent on soil physical properties under a soybean-wheat system in a vertisol. Journal of Plant Nutrition and Soil Science, 167(5), 584-590.*

10. *Lichterman, B. L. (2004). Aspirin: The story of a wonder drug. British Medical Journal, 329(7479), 1408. https://doi.org/10.1136/bmj.329.7479.1408*

11. *Mohamed Haroon, A. R., & Subash Chandra Bose, M. (2004). Use of distillery spentwash for alkali soil reclamation, treated distillery effluent for ferti-irrigation of crops. Indian Farm, 48-51.*

12. *Ramana S, Biswas AK, Kundu S, Saha JK, Yadava RBR (2000). Physiological response of soybean (Glycine max L.) to foliar application of Distillery effluent. Plant Soil Research, 2: 1-6.*

13. *Ramana S, Biswas AK, Kundu S, Saha JK, Yadava RBR (2001). Effect of distillery effluent on seed germination in somevegetable crops. Bio-resource Technology, 82(3): 273-275.*

ISSN:2320-3714
Volume:2 Issue:3
June 2023
Impact Factor: 10.2
Subject: Chemistry

14. *Raverkar KP, Ramana S, Singh AB, Biswas AK, Kundu S (2000). Impact of post methanated spent wash (PMS) on the nursery raising, biological Parameters of Glyricidiasepum and biological activity of soil. Ann. Plant Research, 2(2): 161- 168.*

15. *Tapsell, L. C., Hemphill, I., Cobiac, L., et al. (2006). Health benefits of herbs and spices: The past, the present, the future. Medical Journal of Australia, 185(4 Suppl), S4-S24. https://doi.org/10.5694/j.1326-5377.2006.tb00548.x*

Author's Declaration

I as an author of the above research paper/article, here by, declare that the content of this paper is prepared by me and if any person having copyright issue or patent or anything otherwise related to the content, I shall always be legally responsible for any issue. For the reason of invisibility of my research paper on the website /amendments /updates, I have resubmitted my paper for publication on the same date. If any data or information given by me is not correct, I shall always be legally responsible. With my whole responsibility legally and formally have intimated the publisher (Publisher) that my paper has been checked by my guide (if any) or expert to make it sure that paper is technically right and there is no unaccepted plagiarism and hentriacontane is genuinely mine. If any issue arises related to Plagiarism/ Guide Name/ Educational Qualification /Designation /Address of my university/ college/institution/ Structure or Formatting/ Resubmission /Submission /Copyright /Patent /Submission for any higher degree or Job/Primary Data/Secondary Data Issues. I will be solely/entirely responsible for any legal issues. I have been informed that the most of the data from the website is invisible or shuffled or vanished from the database due to some technical fault or hacking and therefore the process of resubmission is there for the scholars/students who finds trouble in getting their paper on the website. At the time of resubmission of my paper I take all the legal and formal responsibilities, If I hide or do not submit the copy of my original documents (Andhra/Driving License/Any Identity Proof and Photo) in spite of demand from the publisher then my paper maybe rejected or removed from the website anytime and may not be consider for verification. I accept the fact that as the content of this paper and the resubmission legal responsibilities and reasons are only mine then the Publisher (Airo International Journal/Airo National Research Journal) is never responsible. I also declare that if publisher finds Any complication or error or anything hidden or implemented otherwise, my paper maybe removed from the website or the watermark of remark/actuality maybe mentioned on my paper. Even if anything is found illegal publisher may also take legal action against me

Dr. Rajveer Singh Sheoran