Vol 7, Issue 4, 2024 **Impact Factor: 5.099** DOI: https://doi.org/10.31426/ijamsr.2024.7.4.7212

IJAMSR

International Journal of Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

Impact of Salinity on Growth and Yield of Coriander Plants: A Review

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A B S T R A C T

Salinity poses a significant challenge to coriander (Coriandrum sativum L.) cultivation, affecting its growth, yield, and biochemical properties. This study investigates the impact of salinity on coriander, examining how salt stress influences its morphological and physiological characteristics. Through comprehensive analysis, the research aims to identify effective mitigation strategies to enhance coriander's resilience to salinity. Results indicate that while salinity adversely affects coriander growth and productivity, certain interventions, such as biostimulants and optimized irrigation, can significantly reduce the negative impacts. These studies provide valuable insights for sustainable coriander cultivation in saline environments.

Keywords: Salinity, Coriander, Salt Stress, Mitigation Strategies, Biostimulants, Irrigation, Crop Yield, Morphological Characteristics

I. INTRODUCTION

Coriander is a plant that people use in cooking, medicine [1], and as a decoration because it has a special taste and smell. It originally comes from places like Southern Europe and Western Asia and has been grown for a long time because it's important in many cultures' food. But sometimes, coriander faces problems from things like too much salt in the soil or water, which we call salinity. This happens a lot in areas where farmers use a lot of water to grow crops. When too much salt builds up, it can harm the coriander plants and make it hard for them to grow well. This is a big problem for farmers and even for people who grow coriander at home. To help with this issue, it's important to understand how salt affects coriander. By knowing this, farmers and researchers can figure out ways to protect coriander from the harmful effects of salt. In this study, we look at how salt affects coriander's growth [2], how much coriander it produces, its nutritional value, and how good it tastes. We also explore different ways to reduce the damage salt can cause to coriander plants. Overall, the goal is to find ways to help coriander grow well even when there's too much salt around. This helps make sure we can keep enjoying coriander in our food and keep it as an important plant in agriculture [3].

1.1 Background of Salinity Studies in Agriculture

The study of salinity in agriculture has a long history [4], dating back centuries, as people have grappled with the difficulties of growing crops in salt-affected soils and water. Ancient civilizations like those in Mesopotamia, Egypt, and the Indus Valley [5] encountered problems with salinity due to their irrigation practices, which caused salts to build up in the soil, leading to poor crop growth. Early records from Mesopotamia, around 2400 BCE, mention efforts to manage salinity [6] by methods like leaching and adding substances to the soil. Similarly, ancient Egyptian texts describe the negative effects of salty irrigation water and ways to reduce salt accumulation. Throughout history, different cultures developed their own methods to deal with salinity in farming, especially in arid areas like the Middle East and North Africa. They created complex irrigation systems using canals and dikes to control salt levels in the soil, often using freshwater sources to flush out the salts. The understanding of salinity in agriculture grew during the scientific revolution of the 17th and 18th centuries, when scholars began studying the chemical makeup of soils and water. In the late 19th and early 20th centuries, scientists like Justus von Liebig and Dmitri Mendeleev made significant contributions to understanding soil fertility and the effects of salinity on plants.

In the 20th century, as agriculture became more intensive and irrigation expanded, salinity became a major concern globally. Governments, research institutions, and international organizations started extensive studies to understand the extent and causes of salinity and develop ways to manage it. Land-grant universities in the United States, for example, researched saline soils in regions like the Great Plains and developed practices such as tile drainage and salt-tolerant crop varieties [7]. In recent decades, advancements in technology like remote sensing and molecular biology have revolutionized salinity research, allowing scientists to assess salinity on larger scales and understand the genetic basis of plant salt tolerance. There's also growing recognition of how climate change worsens salinity issues through factors like rising sea levels and changing precipitation patterns. Today, salinity still poses a significant challenge to agriculture, affecting about 20% of irrigated lands worldwide [8]. But ongoing research and technological innovations offer hope for more sustainable solutions, such as precision irrigation, soil amendments, bioengineering, and breeding salt-tolerant crops. By building on centuries of knowledge, humanity continues to work towards overcoming the challenges of salinity in agriculture and ensuring food security for future generations.

II. REVIEW OF LITERATURE

A comprehensive review of the literature from 2008 to 2024 reveals the varied impact of salinity on coriander (Coriandrum sativum L.) across several studies, with Google Scholar serving as the primary source for research articles. This chapter examines how salinity affects coriander's growth, yield, and biochemical composition, while also exploring potential mitigation strategies. Overall, these studies provide a rich understanding of salinity's effects on coriander and highlight a range of innovative strategies to enhance the crop's resilience. This comprehensive review emphasizes the

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Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

importance of sustainable practices and targeted interventions to improve coriander's growth and yield in saline environments, contributing to a more sustainable agricultural future.

Sánchez-Navarro, et al. (2024) Incorporating green manure and mitigating Na+ and NO3− levels led to a notable 12.5% increase in soil organic carbon, demonstrating the effectiveness of sustainable practices in soil management. In LS soils, total biomass reached 35.9 tm ha−1, surpassing the 31.9 tm ha−1 in S soils, showcasing the impact of soil type on biomass production, influenced further by salinity levels. Optimal irrigation dosages yielded 29 tm ha−1 of coriander, underlining the critical role of irrigation in maximizing crop yields. However, insufficient irrigation resulted in decreased productivity, emphasizing the necessity for precise irrigation management to prevent production losses and environmental pollution. This study highlights the importance of adopting tailored agricultural practices that not only enhance soil health and biomass production but also mitigate environmental impacts, emphasizing the need for careful irrigation adjustments to sustainably meet agricultural demands.

Hassanein et al. (2022). The study delved into the utilization of biostimulants to bolster coriander's resilience and adaptation to salt-induced stress, imperative in addressing both biotic and abiotic adversities. It underscored the significance of comprehending the molecular, morphological, and physiological reactions to biostimulants to harness their advantages through seed priming. Notably, the amalgamation of humic acid and potassium silicate emerged as the most potent strategy, signifying their promise in safeguarding coriander yields amidst saline environments via seed priming techniques. This finding holds profound implications for sustainable agricultural practices, as it offers a targeted solution to mitigate the detrimental impacts of salinity on coriander cultivation, thereby fostering food security and agricultural sustainability.

Wang et al. (2022). This study delved into the protective properties of coriander (Coriandrum sativum L.) against hypertension resulting from a high-fructose, high-salt diet (HFSD) in Sprague-Dawley (SD) rats. Coriander exhibited notable improvements in glucolipid profiles, decreased sodium retention, and lowered serum uric acid levels. Moreover, it elevated the levels of vasodilator factors in the bloodstream. LC-MS/MS analysis unveiled the presence of flavonoids such as rutin and quercetin in coriander. These findings collectively indicate coriander's potential in mitigating HFSD-induced hypertension through multifaceted physiological mechanisms.

Amiripour et al. (2021). This study investigates the effects of silicon (Si) and salinity on coriander leaves, shedding light on their physiochemical characteristics under salt stress. However, the application of 100 and 200 mg/L Si mitigated the adverse effects of salt stress on growth parameters. Salinity decreased chlorophyll and relative water content, yet Si spray enhanced both. Interestingly, total phenol and flavonoid content increased at 100 mM NaCl but declined at 200 mM. Catalase and superoxide dismutase activity rose under salt stress but decreased with high Si saturation. The optimal treatment for maximizing essential oil production was 100 mM NaCl and 100 mg/L Si, suggesting the potential of Si in enhancing plant development and oil yield under moderate to severe salinity.

Amiripour et al. (2021). By treating coriander plants with varying concentrations of silicon and sodium chloride via foliar spray, the researchers uncovered intriguing insights. Higher EO output was noted in plants subjected to moderate salt stress and supplemented with lower concentrations of silicon. Moreover, the primary components of the EO exhibited varying levels across treatments, suggesting a complex interplay between salt stress and silicon supplementation. Fatty acid profiles also exhibited significant alterations under salt stress, with saturated fatty acids increasing while unsaturated fatty acids decreased. Heat map and principal component analyses provided further clarity on treatment effects. Overall, the findings underscore the nuanced relationship between salt stress, silicon supplementation, and coriander EO and FA composition, offering valuable insights for optimizing plant growth conditions.

Rabiei et al. (2020). Dual inoculation resulted in notable enhancements across various parameters compared to the control group. These improvements included increased chlorophyll content, grain yield, stem fresh weights, and overall plant biomass. Moreover, the treatment with Plant Growth-Promoting Rhizobacteria (PGPR) showed significant effects under salt stress conditions. It not only bolstered catalase activity but also mitigated the activity of ascorbate peroxidase and guaiacol peroxidase in coriander leaves. Additionally, the treated plants demonstrated a favorable shift in ion concentrations, with lower sodium levels and higher potassium concentrations. These findings underscore the potential of PGPRs in fostering coriander growth and offering a promising strategy to counteract the adverse effects of salinity on crop productivity.

El-Kinany et al. (2019). Results from two winter seasons showed that salt stress significantly reduced vegetative growth, fruit output, essential oil yield, and secondary metabolites while increasing electrolyte leakage and proline content. However, treatments with selenium and glycine betaine showed promise in mitigating these negative effects. Plants treated with these substances exhibited improvements in root and leaf development, chemical makeup, and essential oil components compared to the control. Overall, the findings suggest that selenium and glycine betaine treatments could be beneficial for enhancing coriander growth and yield under salt stress conditions.

Ahmadi & Souri (2018). The study delves into the intricate issue of soil salinity and its detrimental effects on coriander plants. By testing various salts and their concentrations, the research sheds light on the nuanced responses of Coriandrum sativum L. to different salinity levels. Notably, treatment with K2SO4 + MgNO3 positively influenced growth parameters, enhancing plant height, shoot weight, and leaf nutrient concentrations. Conversely, the impact of KCl + NaCl + CaCl2 was limited, except for a decrease in plant height and leaf zinc content. Surprisingly, even sodium chloride at EC=2 exhibited some beneficial effects on root weight and leaf nutrient levels. While NaCl at EC=4 lowered several growth and quality parameters, KCl+NaCl+CaCl2 at the same EC increased shoot dry weight while altering leaf nutrient composition. Overall, the study underscores the complexity of salt stress responses in coriander plants, with sodium chloride exhibiting unique effects compared to other salts.

Silva et al. (2018). Employing a factorial design with multiple repetitions, the research explores four ECw levels and two recirculation intervals. Results reveal that increasing ECw negatively affects plant height, shoot fresh matter, and ECw itself, indicating stunted development under salinity stress. Despite reduced water use efficiency with higher ECw, no visible aesthetic effects were observed. Notably, a longer recirculation interval of 2 hours significantly reduced water consumption without compromising production. Overall, the findings underscore the importance of optimizing hydroponic system parameters to mitigate salinity stress and enhance coriander yield sustainably.

Asadi Karam & Keramat (2017). This study investigates the effects of salinity stress on coriander (Coriandrum sativum L.) and evaluates the efficacy of foliar spray with triacontanol (TRIA) in mitigating these effects. The research reveals significant morphological and physiological changes induced by salt stress, including a reduction in root and shoot dry weight. Elevated levels of leaf hydrogen peroxide and lipid peroxidation indicate oxidative stress, while increased activity of antioxidant enzymes suggests a defense response against free radicals. Remarkably, foliar spraying with 10 µM TRIA effectively counteracts the negative impacts of salt stress by modulating antioxidant enzyme activity. This finding underscores the potential of TRIA as a protective measure against salt-induced damage in coriander plants.

Amara & Benrima (2017). This study investigated the impact of salt stress on coriander (Coriandrum sativum L.), revealing significant developmental disruptions. By subjecting coriander to various salt concentrations ranging from 0 to 100 mM/l, the research aimed to uncover biochemical and physiological responses to salinity. Results showed a decrease in biometric parameters and chlorophyll levels, indicating reduced growth and photosynthetic activity under salt stress. However, there was a notable increase in soluble sugars and proline accumulation, suggesting potential adaptive responses to cope with stress. Overall, the findings underscore the morphological changes and physiological adjustments in coriander plants when exposed to salt, shedding light on the mechanisms involved in salt tolerance and adaptation in this important crop species.

Ghamarnia & Daichin (2015). The study investigated the impact of saline shallow groundwater on coriander plants in a semiarid region using lysimetric experiments. Utilizing a randomized full block design with three replicates, various combinations of treatments were tested in 27 columns filled with silty clay soil. Groundwater with different electrical conductivities (EC) and water table depths were maintained, resulting in nine treatments per experiment. Surface water supplementation fulfilled additional watering requirements. Results showed that coriander's average annual water requirements were significantly affected by groundwater salinity and depth, with higher EC levels and deeper water tables reducing water uptake. These findings underscore coriander's susceptibility to salt stress,

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International Journal of
Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

highlighting the importance of managing irrigation practices in saline-prone environments.

Said-Al Ahl et al. (2014). This paper presents a thorough investigation into maximizing the utility of coriander byproduct through essential oil extraction, contributing to its demand. Focusing on regions with varying soil salinity, notably the Sinai Peninsula and Nile Valley, the study evaluates the effects of vitamin C and salicylic acid on coriander productivity and oil composition. Results indicate that combining vitamin C and salicylic acid enhances coriander yield and oil content, particularly in the Giza region. Notably, vitamin C application proves effective in both regions for oil production. Chemical analysis reveals prominent compounds in coriander seed and straw, suggesting potential applications in various industries. Overall, this research provides valuable insights into optimizing coriander cultivation and byproduct utilization, with implications for agricultural and industrial practices.

Aymen & Cherif (2013). The study investigated the effects of salinity levels on the development and yield of a Tunisian coriander cultivar, with a focus on seed priming with NaCl and CaCl2. Results showed a decline in mineral contents, growth metrics, and emergence features as salinity increased. However, seeds primed with NaCl and CaCl2 exhibited superior performance in emergence and growth rate compared to control seeds across all salt levels. Further research is needed to fully understand the impact of seed priming on coriander output and oil content.

Ewase et al. (2013). The study investigated the impact of salt stress on coriander seeds and plants through a pot experiment. Various sodium chloride concentrations (0-4000 ppm) were applied, tracking germination, root development, plant vigor, leaf number, shoot tip necrosis, and plant length. Results indicated a general decline in growth metrics with increasing NaCl concentration, except for shoot tip necrosis, which increased across treatments. Remarkably, coriander plants exhibited resilience to saline conditions up to 3000 ppm NaCl. This research provides valuable insights into the adaptive mechanisms of coriander under salt stress, shedding light on its potential for cultivation in saline environments. However, further investigations into molecular and physiological responses would enrich our understanding of coriander's salt tolerance mechanisms.

Fredj et al. (2013). The study examined the response of four coriander cultivars to saline stress, originating from different regions, to determine optimal seed dispersal timing. Seeds were primed with NaCl at varying concentrations and durations before being exposed to salt solutions for germination. Results revealed that priming with NaCl significantly improved germination rates, with the most effective treatment being 4 g L-1 for 12 hours. Non-primed seeds exhibited greater reductions in germination and growth parameters as NaCl levels increased compared to primed seeds. Among the cultivars, the Egyptian variety appeared the most sensitive to saline stress. Overall, the findings underscore the importance of seed priming in enhancing coriander's tolerance to salt stress, with implications for improving seedling establishment in saline environments.

Ghamarnia et al. (2012). The study employed a randomized block design to investigate the impact of salinity on various parameters of Coriander sativum L. It revealed a substantial decline in seed production, oil output, and water usage efficiency as salt levels increased. Comparing treatments with salinities of 2, 4, and 6 dS/m to the control, water usage efficiency decreased significantly due to losses in seed and oil yield. For each unit increase in salinity, seed yield decreased by 11.54% and oil yield by 18.3%. These findings underscore the vulnerability of coriander to salinity stress, emphasizing the importance of managing soil salinity for optimal crop productivity.

Garg & Bahadur (2011). Dual inoculation resulted in notable enhancements across various parameters compared to the control group. These improvements included increased chlorophyll content, grain yield, stem fresh weights, and overall plant biomass. Moreover, the treatment with Plant Growth-Promoting Rhizobacteria (PGPR) showed significant effects under salt stress conditions. It not only bolstered catalase activity but also mitigated the activity of ascorbate peroxidase and guaiacol peroxidase in coriander leaves. Additionally, the treated plants demonstrated a favorable shift in ion concentrations, with lower sodium levels and higher potassium concentrations. These findings underscore the potential of PGPRs in fostering coriander growth and offering a promising strategy to counteract the adverse effects of salinity on crop productivity.

Neffati & Marzouk (2010). The study investigates the impact of salt stress on Tunisian coriander's vegetative development and essential oil composition. Hydroponically grown seedlings were exposed to NaCl concentrations ranging from 25 mM to 75 mM. Results show that while biomass remained unaffected at 25 mM NaCl, it drastically decreased at higher concentrations. Both stems and leaves contained essential oils, with varying compositions. Under mild stress, stem oil content decreased, while leaf oil content increased significantly. High salt exposure led to substantial reductions in oil content in both organs. The most prevalent volatile component was (E)-2-decenal, accompanied by other key compounds. Interestingly, the concentration of these chemicals varied based on treatment and organ type. This comprehensive analysis sheds light on salt stress responses and essential oil dynamics in coriander.

Neffati & Marzouk (2009). Over three weeks, seedlings were exposed to varying sodium chloride concentrations. Essential oil production remained stable at 25 mM NaCl but notably increased at higher concentrations, peaking at 0.21% at 75 mM. (E)-2-dodecenal was the predominant volatile component, comprising 52% of total essential oil components. Fatty acid levels significantly rose at 50 and 75 mM NaCl, with linoleic, oleic, and palmitic acids identified as primary components. The oleic/linoleic ratio decreased with increasing NaCl content. The findings provide insights into the response of coriander roots to salt stress, impacting essential oil and fatty acid composition.

Neffati & Marzouk (2008). The study investigated the impact of salt stress on the essential oil and fatty acid composition of hydroponically grown Tunisian coriander leaves. Results showed that at lower NaCl concentrations (25 mM), essential oil production increased by 18%, but sharply declined

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Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

as salinity levels rose. Notably, the ratio of unsaturated to saturated fatty acids decreased with increasing NaCl concentrations, potentially affecting membrane rigidity. Overall, the findings highlight the complex biochemical responses of coriander leaves to salt stress, affecting both essential oil production and fatty acid composition.

III. Comparative Analysis of Literature Background

Author (Year)	**Research Objective**	**Materials Used**	**Methodology**	**Findings**
Sánchez-Navarro et al. (2024)	Investigate soil salinity and irrigation effects on coriander biomass and edaphic processes.	Representative soils, oat-vetch, spinach, coriander, irrigation doses	Soil parameters tracked, oat-vetch intercalated, irrigation doses varied.	Salinity decreased Na+ and NO3−, but organic carbon increased by 12.5%. Optimal irrigation boosted coriander yield, while deficit doses reduced production significantly. Excessive irrigation risked ion leaching.
Hassanein et al. (2022)	Assess beneficial effects of biostimulants on salt-stressed coriander, exploring molecular responses.	Gamma irradiation, potassium silicate, humic acid	Salt stress reduced growth, but biostimulants improved yield, metabolic activity, and RuBisCO expression.	Biostimulants relieved salt stress, improving growth, yield, and metabolic activities. Potassium silicate and humic acid combination proved most effective in mitigating salt effects.
Wang et al. (2022)	Investigate coriander's potential in mitigating hypertension induced by high-fructose, high-salt diet.	Coriander, high-fructose, high-salt diet, rats	Coriander reduced blood pressure, improved glucolipid profiles, and altered gut microbiota.	Coriander alleviated hypertension, improved glucolipid profiles, and modulated gut microbiota in rats fed high-fructose, high-salt diet.
Amiripour et al. (2021)	Examine silicon's impact on coriander under salt stress, focusing on antioxidant capacity and growth.	Silicon, salt stress, coriander leaves	Si mitigated salt stress effects, enhancing growth, chlorophyll content, and antioxidant activity.	Silicon reduced salt stress effects, improving growth, chlorophyll content, and antioxidant activity in coriander leaves.
Amiripour et al. (2021)	Analyze salt and silicon effects on coriander essential oil production and fatty acid composition.	Silicon, salt stress, coriander leaves	Salt stress increased EO production, altered FA composition. Si mitigated salt effects on EO and FA.	Salt stress increased EO production and altered FA composition. Si mitigated salt effects on EO and FA in coriander leaves.
Rabiei et al. (2020)	Investigate plant growth-promoting rhizobacteria effects on coriander under salt stress.	Azospirillum brasiliense, Azotobacter chroococcum, coriander seeds	PGPR enhanced coriander growth under salt stress, improving yield, antioxidant activity, and ion balance.	PGPR enhanced coriander growth under salt stress, improving yield, antioxidant activity, and ion balance.

El-Kinany et al. (2019)	Assess selenium and nano-selenium effects on coriander growth and essential oil under salt stress.	Selenium, nano-selenium, coriander, salt stress	Selenium and nano-selenium mitigated salt stress effects, improving growth and essential oil content.	Selenium and nano-selenium mitigated salt stress effects, improving coriander growth and essential oil content.
Ahmadi & Souri (2018)	Examine the impact of different salt types on coriander development and quality.	Sodium chloride, potassium chloride, calcium chloride, potassium sulfate, magnesium nitrate, coriander	Salt type affected coriander growth and quality differently.	Different salts affected coriander growth and quality differently.
Silva et al. (2018)	Evaluate coriander growth and water consumption under different salinity levels in hydroponic systems.	Coriander, hydroponic system, electrical conductivity (EC), nutritional solution recirculation	Salinity reduced coriander growth and water consumption in hydroponic systems.	Salinity reduced coriander growth and water consumption in hydroponic systems.
Asadi Karam & Keramat (2017)	Investigate triacontanol effects on salt-stressed coriander, focusing on morphological changes.	Triacontanol, coriander seeds	Triacontanol mitigated salt-induced morphological changes in coriander.	Triacontanol mitigated salt-induced morphological changes in coriander.
Amara & Benrima (2017)	Assess biochemical and physiological responses of coriander to salt stress.	Coriander, salt stress	Salt stress induced morphological changes, increased soluble sugars and proline in coriander.	Salt stress induced morphological changes, increased soluble sugars and proline in coriander.
Ghamarnia & Daichin (2015)	Investigate salty groundwater impact on coriander. 27 columns of soil, 4 salinity levels (1, 2, 4, 6 dSm^{-1}), 3 water table depths.	Soil columns, saline water	Lysimetric experiments with varied saline water levels and water table depths.	Coriander's water needs met mainly by groundwater; salinity significantly impacts plant characteristics, influencing water and nutrient uptake.
Said-Al Ahl et al.. (2014)	Investigate coriander's productivity under salinity. Field experiment, 2 regions, 2 treatments (vitamin C, salicylic acid).	Vitamin C, salicylic acid, region	Field experiment comparing coriander productivity under different treatments and regions.	Improved coriander productivity with combined vitamin C and salicylic acid treatment, with regional variations observed; key volatile oil components identified in seeds and straw.
Aymen & Cherif (2013)	Examine salt effects on coriander growth. 5 salinity levels (0, 2, 4, 6, 8 g l-1), primed seeds.	Seeds, NaCl solutions	Coriander seeds primed with NaCl, grown under different salt levels to evaluate growth responses.	Primed seeds outperformed control seeds under salt stress; growth metrics declined with increasing salt, mitigated by seed priming; potential for improved coriander output.

Ewase et al. (2013)	Study salt impact on coriander germination. Pot experiment, 5 treatments (0, 1000, 2000, 3000, 4000 ppm NaCl).	NaCl solutions	Pot experiment assessing coriander's germination and growth under different NaCl concentrations.	Increasing NaCl concentrations reduced coriander growth parameters; shoot tip necrosis increased; salt tolerance observed up to 3000 ppm.
Fredj et al. (2013)	Assess coriander cultivars' response to salt stress. Primed seeds, 5 NaCl concentrations (0, 2, 4, 6, 8 g L-1), 3 soaking times (12, 24, 36 hours).	Coriander seeds, NaCl solutions	Evaluation of coriander cultivars under various NaCl concentrations and soaking durations to determine optimal germination conditions.	NaCl priming improved germination rate; reduced growth observed with increasing NaCl levels, less pronounced in primed seeds; Egyptian variety most resilient.
Ghamarnia et al. (2012)	Investigate salinity effects on coriander. Pot experiment, 4 salinity levels (1, 2, 4, 6 dS/m).	Polyethylene pots, saline solutions	Pot experiment assessing seed and oil yield, water use efficiency under different salinity levels.	Coriander's seed and oil yield decline with increasing salinity; water use efficiency decreases significantly with salinity rise; high salt sensitivity observed.
Garg & Bahadur (2011)	Study salt impact on coriander. Split plot design, 5 ESP levels (10, 20, 30, 40, 50), 4 varieties.	Soil with varying ESP levels, coriander seeds	Investigation of coriander growth, yield, and quality under different ESP levels and varieties.	ESP affects coriander germination and inflorescence formation; RCr-41 variety exhibits superior seed yield and oil content; sodium exclusion mechanism observed.
Neffati & Marzouk (2010)	Examine salt effects on coriander essential oil. Hydroponic culture, 4 salt levels (25 mM to 75 mM NaCl).	NaCl solutions, hydroponic system	Hydroponic study on coriander essential oil production under different NaCl concentrations.	Biomass unaffected at 25 mM NaCl; essential oil content drops at 50 and 75 mM NaCl; some components increase under salt stress.
Neffati & Marzouk (2009)	Investigate salt effects on coriander root fatty acids. Hydroponic culture, 4 salt levels (0, 25, 50, 75 mM NaCl).	NaCl solutions, hydroponic system	Hydroponic study examining fatty acid changes in coriander roots under varying NaCl levels.	Essential oil content increases with mild salt stress, decreases with high salt; fatty acid composition shifts with NaCl concentration, affecting unsaturated to saturated ratio.
Neffati & Marzouk (2008)	Investigate salt impact on coriander leaf essential oil and fatty acids. Hydroponic culture, 2 salt levels (25, 50 mM NaCl).	NaCl solutions, hydroponic system	Hydroponic study evaluating coriander leaf essential oil and fatty acid changes under two NaCl concentrations.	Essential oil content increases with mild salt stress, decreases with high salt; fatty acid composition shifts with NaCl concentration, affecting unsaturated to saturated ratio.

International Journal of
Advanced Multidisciplinary Scientific Research (IJAMSR) ISSN:2581-4281

IV. CONCLUSION AND FUTURE WORK

Salinity significantly impacts coriander's growth, yield, and biochemical properties. Effective mitigation strategies, such as bio stimulants and optimized irrigation, can reduce these negative effects. Future research should focus on developing salt-tolerant coriander varieties and exploring advanced biotechnological interventions to further enhance the crop's resilience to salinity. Sustainable agricultural practices must be promoted to ensure the continued cultivation of coriander in saline environments, thereby supporting food security and agricultural sustainability.

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