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Research Article

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[Nitrogen Fixation and Yield of Common Bean Varieties in Response to Shade and Inoculation of Common Bean](#)

Light is not only a primary energy source, but it is also one of the environmental factors that affect plant growth and development. Common bean (*Phaseolus vulgaris* L.) is commonly produced in association with maize as subordinate intercrops in the Sidama region. Under such a production system, the shade effect may limit the photosynthetic and nitrogen-fixing capacity of common beans. The objective of the current study was to assess how inoculation and shade affect the ability to fix nitrogen and yield components of common beans. Three common bean varieties (Hawassa dume, Nassir, and Ibbado), two shade levels (open and 25% shade) as well as two levels of inoculation (uninoculated and inoculated) were used for these purposes. The experiment was set up in factorial randomized complete block design (RCBD) in four replications. In this experiment, Rhizobium inoculation and shade significantly ($p < 0.05$) affected the number of pods plant⁻¹ and the number of seeds pod⁻¹. The inoculated treatment produced the maximum number of pods plant⁻¹ (14.02) and the lowest number of pods plant⁻¹ (10.95) was obtained from uninoculated treatments. The results also showed that the inoculated Hawassa dume variety from the open treatments derived the maximum percentage of N from N₂ fixation, whereas the non-inoculated Ibbado variety from the 25% shade treatments derived the lowest percentage of N. Common bean grown on full light had significantly greater N content than shade.

Research Article

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[Screening of Auxin-like Substances among Synthetic Compounds, Derivatives of Pyridine and Pyrimidine](#)

The effect of known synthetic compounds Ivin (N-oxide-2,6-dimethylpyridine), Methyur (sodium salt of 6-methyl-2-mercapto-4-hydroxypyrimidine), Kamethur (potassium salt of 6-methyl-2-mercapto-4-hydroxypyrimidine) and new synthetic compounds, derivatives of pyrimidine (No. 1 - 7) on the rooting of isolated stem cuttings of haricot bean (*Phaseolus vulgaris* L.) variety Bilozernaya was studied. The growth regulatory activity of synthetic compounds Ivin, Methyur, Kamethur, and synthetic compounds, derivatives of pyrimidine (No. 1 - 7) was compared with the activity of auxins IAA (1H-indol-3-yl)acetic acid) and NAA (1-naphthylacetic acid). The conducted studies showed that the regulatory effect of synthetic compounds Ivin, Methyur, Kamethur, and synthetic compounds, derivatives of pyridine (No. 1 - 7) on the rooting of isolated stem cuttings of haricot bean was similar to the auxins IAA and NAA. The synthetic compounds Ivin, Methyur, and Kamethur, and synthetic compounds, derivatives of pyrimidine (No. 1, 4, 5, and 7) showed the highest auxin-like activity. The indicators of the total number of roots (pcs) and total length of roots (cm) obtained on isolated stem cuttings of haricot bean immersed in a water solution of synthetic compounds Ivin, Methyur, Kamethur and synthetic compounds, derivatives of pyrimidine (No. 1, 4, 5 and 7), used at a concentration of 10⁻⁷ M, statistically significantly exceeded similar indicators obtained on control isolated stem cuttings of haricot bean immersed in distilled water. The practical use of synthetic compounds Ivin, Methyur, Kamethur, and synthetic compounds, derivatives of pyrimidine (No. 1, 4, 5 and 7) is proposed to improve the vegetative propagation of haricot bean plants (*Phaseolus vulgaris* L.) and other plant species of the family Fabaceae by stem cuttings.

Research Article

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[Management of Chocolate Spot Disease in Faba Bean Plants by using Biological Control Means](#)

Background: Faba bean (*Vicia faba* L.) is one of the most important grain legume crops in Egypt and many other countries of the world because the seeds offer a low-cost source of protein, lysine, carbohydrates, minerals, and vitamins. Chocolate spot disease is a stress-related fungal disease produced by *Botrytis fabae* that causes plant damage, limits photosynthetic activity, and reduces yield.

Results: *Trichoderma atroviride* greatly reduced mycelial growth by 90.00% in vitro, followed by *T. harzianum* (86.67%) and *T. album* (83.89%) on average. In vivo, all studied antagonists dramatically reduced *Botrytis fabae* disease incidence and severity in both seasons 2021/22 and 2022/23. *T. atroviride* showed the highest efficacy bioagent (73.55 and 85.15%), followed by *T. harzianum* (72.55 and 81.22%), in controlling *B. fabae* of faba bean plants in both seasons. In addition, the results also showed that all tested biological treatments had an impact on yield components and increased levels of chlorophyll, protein%, phenols, flavonoids, Peroxidase (PO), polyphenol Oxidase (PPO), chitinase, and -1, 3-glucanase activities compared to control treatment in both seasons. In this regard, spraying *T. atroviride* showed the highest efficacy as a bioagent, followed by *T. harzianum*. Contrary, *T. hamatum* showed the lowest efficacy compared to other treatments in both seasons.

Conclusion: This investigation was carried out to determine the effectiveness of several different antagonists, i.e., *T. album*, *T. atroviride*, *T. hamatum*, and *T. harzianum* (30 x 10⁶ spore/ml), Blight Stop, and Bio Zeid, for controlling *Botrytis fabae* on bean plants and evaluating their effect on yield parameters, components, and quality.

Research Article

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[Molluscicidal Efficacy of Essential oils of *Syzygium aromaticum* Clove and *Tachyspermum ammi* Seeds against *Lymnaea acuminata*, a Vector Snail](#)

In eastern Uttar Pradesh, fascioliasis, an endemic zoonotic disease, is quite prevalent. Essential oils that are produced from various plants are extremely important to human health. The current study found that the essential oils from *Tachyspermum ammi* seeds and *Syzygium aromaticum* cloves are effective herbal molluscicides against the vector snail *Lymnaea acuminata*. *Syzygium aromaticum* cloves and *Tachyspermum ammi* seeds are used to extract their essential oils using both conventional and unconventional techniques, such as solvent extraction (SE) and hydrodistillation (HD). The results section makes it evident that both of the essential oils from *Syzygium aromaticum* clove and *Tachyspermum ammi* seeds have a high level of molluscicidal activity (24-hour LC₅₀ values are 3.01 and 2.35), particularly against the vector snail *Lymnaea acuminata*. The current investigation unequivocally showed that the exposed vector snails to the essential oils are extremely harmful. The aim of the present investigation is to establish the molluscicidal activity of the essential oils of *Syzygium aromaticum* clove and *Tachyspermum ammi* seeds against the vector snail *Lymnaea acuminata*.

Research Article

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[Diversity of Rust Fungi Causing Plant Diseases in Abbottabad, Khyber Pakhtunkhwa \(KP\), Pakistan](#)

In 2018, a survey of rust fungi and their associated hosts was attempted in the thandiani regions of Pakistan. In this paper, we provided descriptions and illustrations of six rust species viz. *Melampsora euphorbiae*, *Phragmidium barclayi*, *Puccinia ambegua*, *Puccinia calcitraipae*, *Puccinia mentha* and *Puccinia ustalis*. The *Melampsora euphorbiae*, *Puccinia ambegua*, and *Puccinia ustalis* were collected as a new host record from Abbottabad. Most of the rust fungi were collected from herbaceous wild plants. This study suggests further exploration of the area of rust disease in order to assess the diversity of these fungi. This research work is an addition to available data related to the Uredinales of Pakistan having special reference to Abbottabad District, Khyber Pakhtunkhwa, Pakistan.

Research Article

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[Exploring the Complexity of Protein Structure Determination Through X-ray Diffraction](#)

The determination of a protein structure by using X-ray diffraction encompasses a series of sequential steps (including gene identification and cloning, protein expression and purification, crystallization, phasing model building, refinement, and validation), which need the application of several methodologies derived from molecular biology, bioinformatics, and physical sciences. This article thoroughly examines the complicated procedure of elucidating protein structures within plant biology, using X-ray diffraction as the primary methodology. Commencing with the gene identification process and progressing toward crystallography, this article explores the many obstacles and achievements in acquiring diffraction pictures and their subsequent conversion into electron density maps. The ensuing phases of model construction, refinement, and structural validation are thoroughly examined, providing insight into the inherent complexity associated with each stage. The paper also discusses the critical component of understanding the resultant model and scrutinizing its biological significance. By comprehensively examining these stages, this article presents a nuanced comprehension of the intricate procedure in ascertaining protein structures within plant biology. It offers valuable insights into the obstacles encountered and the biological importance of the acquired structural data.

Research Article

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[Nitrogen supply effect on lettuce response to *Botrytis cinerea* and *Sclerotinia minor*](#)

Background information: Cultural practices play an important role on the development of pathogens (Datnoff, et al. 2007). In this context, several authors have been interested in studying the effects of mineral nutrition on the resistance of vegetables and fruits to fungi during storage, especially nitrogen.

The purpose of the study: In this work we tested the effects of three contrasted regimes of nitrogen supply, with nitrate concentrations in the nutrient solutions of 2 mM (low), 10 mM (normal) and 20 mM (high) on the susceptibility of *Lactuca sativa* L towards *Botrytis cinerea* (BC87) and *Sclerotinia minor* (SM) during storage.

Once harvested, the outerleaves of the plants derived from the three nitrogen regimes were inoculated with either *Botrytis cinerea* (BC87) or *Sclerotinia minor* (SM). Data showed that the resistance to these two pathogens increases when plants were developed under low nitrogen concentration. This resistance observed is correlated with low values in oxidative stress indicators (MDA and H₂O₂) and high values in total phenols.

Research Article

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[Fallow Lands of Tuva \(Russia\): 30 years of Steppe Demutation](#)

Tuva has been a cattle-breeding region since ancient times, extremely continental climate of this region is little suitable for agriculture. However, the steppes of intermountain depressions in Tuva were heavily plowed by the early 1980s. In the 1990s most of the arable lands were abandoned; the process of restoration (demutation) of natural vegetation on fallow lands began. By now, 30 years later, the old fallows are expected to achieve the stage of the secondary steppe.

The purpose of this work is to estimate the differences between virgin steppes and corresponding secondary steppes in Tuva. Tussock, hummock, and desert virgin steppes have been compared with corresponding to three types of 30-year-old fallow communities. For this study, 330 geobotanical relevés have been used. The criteria for comparison have been chosen as follows: the similarity of species composition, the spectrum of dominant species, species richness, grass cover, and grass height. The statistical validity of their differences has been verified.

According to these criteria, virgin steppes and their 30-year-old fallow derivatives are shown to differ significantly.

Research Article

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[Determination of the Potential for use of Plant Essential Oils as a Fungicide Against *Fusarium Oxysporum* \(OG10\)](#)

This study aimed to determine whether the essential oils of thyme, ginger, and mint from medicinal aromatic plants can provide resistance to the pathogen *Fusarium oxysporum* in the maize plant. To this end, the antifungal effect of 0.1 ml, 0.25 ml, 0.5 ml, and 1 ml essential oil amounts was determined by the agar disc diffusion method. It was determined that concentrations containing 0.1, and 0.25 ml essential oil showed no antifungal effects, however, concentrations containing 0.5 and 1 ml essential oil had antifungal effects. The most effective concentration was found to be 1 ml of essential oil in all three species. The maize was grown under hydroponic conditions. Thyme, ginger, and mint essential oils (1 g/100 ml) were applied to the root medium of the grown maize plant on the 8th day. An *F. oxysporum* suspension containing 10⁷ spores was applied after 24 hours and harvested 3 days later. When the reactive oxygen species (H₂O₂) and MDA amounts of the harvested plants were examined, it was observed that there was an increase in the population of *F. oxysporum*. However, applications of thyme, ginger, and mint essential oil have been observed to significantly reduce these. It was also determined that essential oils protected the plant against *F. oxysporum* by increasing antioxidant enzyme activities. Although these three essential oils applied have antifungal properties, it has been observed that the best effect belongs to thyme essential oil. The results show that essential oils of thyme ginger and mint can be used as potential fungicides against the pathogen *F. oxysporum* in maize cultivation

Thesis **Published Date:-2023-09-13 11:02:14**

[Analysis of Microbial Diversity and Community Structure in the Rhizosphere of Cigar Tobacco in Different Agroecological Zones](#)

To reveal the influence of ecological zones on the structure of microbial communities in cigar rhizosphere soils, Yunnan's cigar tobacco production region was first divided into three ecological zones. Soil samples were collected at maturity and the community structure of fungi and bacteria in the rhizosphere soil was analyzed using 18S rRNA and 16S rRNA high-throughput sequencing techniques. The results showed that the dominant fungi were Ascomycota, Mortrellomycota, and Basidiomycota, and the dominant bacteria were Ascomycota and Proteobacteria. The dominant genera and relative abundances of fungi and bacteria differ at the genus level. Ecoregions may affect the community structure and distribution of fungal and bacterial diversity in the rhizospheric soil of cigars at maturity, which may provide a theoretical basis for the selection of high-quality cigar-producing regions in the future.

Research Article **Published Date:-2023-09-01 16:26:27**

[Impact of Biofertilizers & Different doses of NPK on Growth and Photosynthetic Pigments of Okra Plant \(*Abelmoschus Esculentus* L. Moench\)](#)

Okra is an herbaceous hairy annual plant that belongs to the family Malvaceae. It is cultivated in tropical, subtropical, and warm temperate regions around the world. The present work was carried out to study the effect of biofertilizers (*Azotobacter* + *Bacillus*) and different concentrations of Nitrogen, Phosphorus, and Potassium i.e. NPK on growth and photosynthetic pigments of okra (*Abelmoschus esculentus* L. Moench). Okra can be named a multipurpose crop as its various parts such as leaves, buds, flowers, pods, stems and seeds can be used for different purposes [1]. Okra is rich in dietary fiber, vitamins, oils, etc. Application of hazardous fertilizers causes a nutrient imbalance in soil, With respect to reducing the causes due to chemical fertilizers, biofertilizers are suited best to maintain higher productivity and yield of crops. Random block design (RBD) was selected as an experimental design. The treatments combination taken are T0- Control, T1- *Azotobacter* + 50% NPK, T2- *Azotobacter* (2.5 kg/ha) + 100% NPK, T3- *Bacillus* (2.5 kg/ha) + 50% NPK, T4- *Bacillus* (2.5 kg/ha) + 100% NPK, and T5 with NPK 100%. The final result revealed, that the treatment combination with *Azotobacter* + 100% NPK (T2) showed the highest value of plant height (65.60 cm), number of leaves per plant(62.36), number of flowers per plant (27.40), and also carotenoid content (2.82 mg/g), chlorophyll a(2.47 mg/g) and chlorophyll b(3.25 mg/g) were observed maximum. So, it can be concluded through this paper that the combination of *Azotobacter* 2.5 kg/ha + 100% NPK (T2) is suitable for the okra plant for better growth and enhancement of photosynthetic potential in-field practices.

Research Article **Published Date:-2023-09-01 16:20:49**

[THz Analysis in the Depth of a Sunflower Leaf](#)

The internal structure of a sunflower leaf could be reconstructed by applying RET reverse engineering techniques on measurements from terahertz time-domain probing (Time Domain Spectroscopy TDS). This new and non-destructive method allows us to follow the evolution of this structure in time during a process of dehydration. This paper is a synthesis of our previous work.
