

Effect of natural wind sound on flowering responses of marigold (*Tagetes erecta* L.) cultivated in the agricultural fields of Nagri Block, Ranchi, Jharkhand: An observational study

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ABSTRACT

Environmental factors such as temperature, light, rainfall, humidity, and wind influence the growth and flowering of crop plants. Among these factors, the movement of wind produces natural vibrations and sound that may accompany mechanical stimulation of plants. The present observational study was conducted in the agricultural fields of Nagri Block, Ranchi, Jharkhand, to explore whether areas experiencing continuous natural wind movement showed any noticeable differences in the flowering of marigold (*Tagetes erecta* L.). Field observations were carried out during the flowering season by visiting marigold farms located in open and partially sheltered areas. Farmers were interviewed regarding flowering behaviour, flower quality, and crop performance. Plants growing in well-ventilated open fields generally showed healthy stems, uniform flowering, and reduced moisture accumulation on foliage. However, the study could not separate the effects of wind sound from other associated environmental factors such as airflow, sunlight, and humidity. The findings suggest that the observed differences are more likely related to the overall field microclimate than to sound alone. Controlled experiments are required to determine whether sound itself has an independent effect on marigold physiology.

Key Words - Marigold, *Tagetes erecta*, Nagri Block, Ranchi, wind, flowering, observational study, plant physiology.

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INTRODUCTION

Marigold (*Tagetes erecta* L.) is one of the most widely cultivated ornamental flowers in India because of its commercial, religious, and decorative value. In Jharkhand, marigold cultivation provides an important source of income for farmers, especially during festival seasons. The productivity and flowering of marigold depend on environmental conditions including sunlight, soil fertility, irrigation, temperature, humidity, and air circulation.

Plants are continuously exposed to natural mechanical forces such as wind. Wind not only improves air movement around plants but also causes leaves and stems to vibrate. The movement of air creates natural sound, although the biological significance of this sound remains uncertain. Some laboratory studies have investigated plant responses to acoustic vibrations, but evidence is still limited and species-specific.

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This study documents field observations from Nagri Block to examine whether farmers noticed any differences in flowering performance in marigold crops exposed to regular natural wind movement. The main objectives include observe flowering characteristics of marigold cultivated in different field conditions of Nagri Block, document farmers' observations regarding wind-exposed and relatively sheltered fields and discuss possible physiological explanations while distinguishing observation from established scientific evidence.

MATERIALS & METHODS

Study Area

Nagri Block is located in Ranchi district, Jharkhand. The area has a tropical climate with a monsoon season, moderate winter temperatures, and fertile agricultural land. Marigold is cultivated by many farmers for local markets and festive demand.

Open fields in the region experience regular natural wind movement, whereas fields bordered by trees, buildings, or other vegetation often have lower wind exposure. These differences create varying microclimatic conditions.

Methods

The study was based on field observations conducted during the flowering period of marigold cultivation. Visits to marigold fields in different villages of Nagri Block, Visual and microscopic observation of flowering intensity, flower size, plant vigour and general crop condition, Informal discussions with local farmers regarding crop performance, Comparison of crops grown in open and partially sheltered locations, Review of scientific literature on plant responses to wind and mechanical stimulation and laboratory analyses were performed.

Observations

Several farmers reported that marigold plants grown in open, well-ventilated fields appeared healthier than those in more sheltered areas. Common observations included:

- More uniform flowering across the field.
- Strong, upright stems with less lodging.

- Lower persistence of moisture on leaves after rainfall or irrigation.
- Fewer visible fungal symptoms under favourable weather conditions.
- Better air circulation around the crop canopy.

These observations were consistent among several field visits, although variation was also influenced by irrigation, soil condition, fertilization, and crop management.

DISCUSSION

The observations suggest that differences in flowering are better explained by the combined effects of airflow and field microclimate rather than by wind sound alone.

Wind can influence plants by:

- Improving gas exchange around leaves.
- Reducing excess humidity that favours fungal diseases.
- Increasing stem strength through repeated mechanical stimulation.
- Modifying canopy temperature and evaporation.

Natural wind also produces sound, but in field conditions it is not possible to separate the effect of sound from the physical movement of air. Therefore, attributing changes in flowering specifically to sound would not be scientifically justified based on observational data alone.

Some experimental studies have shown that plants can respond to controlled acoustic vibrations, but these findings cannot be directly applied to natural agricultural conditions without carefully controlled experiments.

Physiological Considerations

Healthy flowering in marigold depends on efficient photosynthesis, nutrient uptake, hormonal balance, and favourable environmental conditions. Improved air movement may contribute indirectly to flowering by:

- Maintaining healthier foliage.
- Reducing disease pressure.

- Supporting stronger stem development.
- Creating a favourable canopy environment

CONCLUSION

Field observations from Nagri Block indicate that marigold cultivated in well-ventilated open fields often exhibited healthy flowering and stronger plant growth. However, these observations cannot demonstrate that the sound of wind itself caused the flowering differences. The results are more consistent with the beneficial effects of airflow and favourable microclimatic conditions. Future research should use controlled acoustic treatments together with measurements of wind speed, flowering parameters, and physiological responses to determine whether sound has an independent influence on marigold cultivation.

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