THE SCIENCE WORLD
A Monthly e Magazine
ISSN:2583-2212
Popular Article
Sept, 2023; 3(09), 2266-2269

Modern Farming: Black Turmeric (*Curcuma caesia*) cultivation under soilless medium

Harendra Kumar*, Ankur Agarwal
*Senior Research fellow, Defence Institute of Bioenergy Research (DRDO), Goraparao Haldwani (Nainital) -263139
Scientist 'F', Defence Institute of Bioenergy Research (DRDO), Ministry of Defence, Goraparao Haldwani (Nainital) -263139
https://doi.org/10.5281/zenodo.8346270

Abstract

Black turmeric commonly known as "**kali Haldi"**. It is an industrially important plant now categorized as endangered species. Due to the Ethnobotanical importance, it is useful for the treatment of many diseases. An experiment was conducted during, Sep.2021 to Jan.2022 at DIBER, DRDO, Haldwani, Nainital (Uttarakhand). During the study period, the maximum and minimum temperature of the field and low-cost shade net recorded was 28-34°C and 16 -18 °C, respectively. soil less cultivation system used for the growing the crop was a UV stabilized buckets white color and vertical net pot filled with mixture of coco peat and vermiculite and partite ratio (3:1:1). The aim of this study was grown Black Turmeric under soilless culture. The result found that the germination of turmeric rhizome takes place under soilless culture after 15 DAT. Nutrients solution supplied after the germination. The result shows the growth of crop after 15 days. The number of rhizomes arising from mother rhizome also positively effect on production under soilless culture. The 5-7 rhizome node growth found after one month. The maximum (20 cm) plant growth found after one month from DAT. The maximum yield (1-1.5 kg/plant) found under per pot. Whereas the minimum average yield was found (560 gm/plant) under per pot.

Key words: Modern Faming, Hydroponics, NFT, Black Turmeric

Introduction

1. Soilless is a method of growing the crops without soil with the help of nutrient solution. With increasing scarcity of water availability, increased levels of residual toxicity in conventionally farming and rapid growth rate of Urban population have attracted the global attention towards the use of intensive cropping systems and paved the way for new technologies such as soilless culture and hydroponics **(Al-Karaki *et. al.*,2012; Pant *et al.*, 2018; Agarwal *et. al.*, 2019).** The advantages of soilless cultivation are that it requires small space with provision to vertical space utilization, higher nutrients use efficiency. This technique also facilitates roof farming and indoor farming. Soilless culture also plays an important role towards the precision farming by supporting the principle of "right time, right input, right quantity and right location". Soilless technology not only

offers vertical utilization but also maintains quality and increases productivity. Endangered Black turmeric **(*Curcuma caesia*) commonly** known as **"kali Haldi"** belong to the family Zingiberaceae. It is an industrially important plant now categorised as endangered species **(Behar *et.al.* 2014, Borah *et. al.*, 2020).** Traditionally it is useful for the treatment of many diseases such as asthma, leprosy, menstrual disbalance, piles, rheumatism related inflammatory pains etc. It is most important medicinal plant as well as aromatic plant. The aromatic nature found in kali haldi which play a vital role in the auspicious spiritually in various region of India. The colour of rhizome is blackish -blue it is well known as sister species of Curcuma its hold good economic importance for local tribe and for its high antibacterial and anti-fungal potential since ancient times. keeping in the view the ethnobotanical importance and current extinction status of the black turmeric species, the present research aim is the cultivation of black turmeric under soilless culture.

Advantages of Soilless cultivation: This technology having the following advantages as compared to conventionally farming:

2. Soilless cultivation also considering under organic farming due to zero use of insecticide, pesticides and chemical fertilizers.
3. More water saving takes place under soilless culture as compared to conventional farming in conventionally farming more wastage of water takes place due to sprinkler /overhead, irrigation and higher loss of water due to evapotranspiration.
4. soilless cultivation can be easily practices as kitchen gardening, roof farming and under indoor cultivation.
5. Soilless technology also suitable at boarder area which can play a vital role for Defence purpose.
6. Higher production and productivity can be achieved under soilless cultivation due to more utilization of vertical space and protection from soilborne diseases.
7. Hydroponics cultivation is low constable due to more interculture operation required under conventionally farming such as; weeding, hoeing, and the cost of fertilizers broadcasting, irrigation time is also affectable under conventionally farming.

Materials and methods

The experiment was conducted during, Sep.2021 to Jan.2022 at DIBER, DRDO, Haldwani, Nainital (Uttarakhand). During the study period, the maximum and minimum temperature of the field and low-cost shade net recorded was 28-34°C and 16 -18 °C, respectively. soil less cultivation system used for the growing the crop was a UV stabilized buckets white color and vertical net pot filled with mixture of coco peat and vermiculite and partite ratio (3:1:1). Nutrient solution supplied to grow the plants through irrigation pump. pH ranged from 6 to 7.0 during the experiment and Electrical

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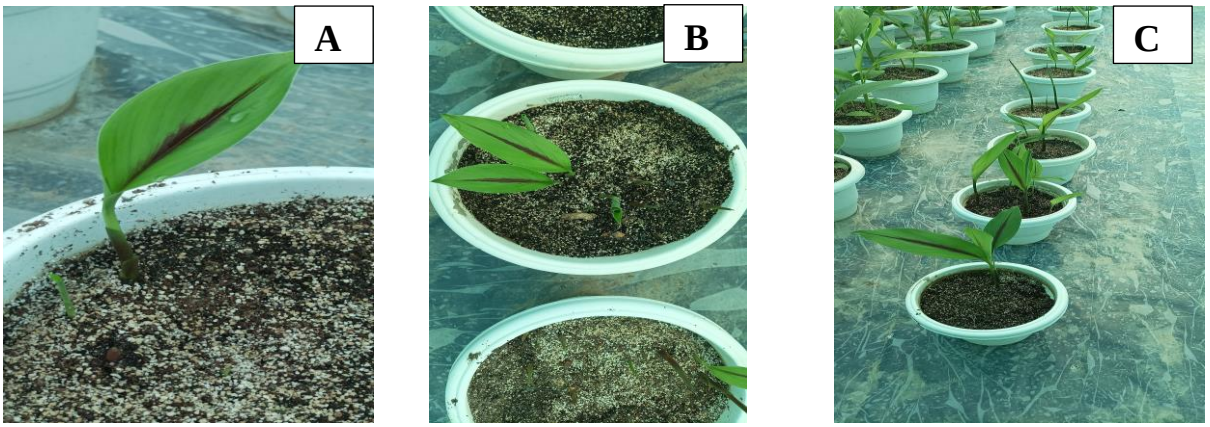
Published: **11.09.2023**

conductivity (EC) 1800±100ppm. Electrical conductivity (EC) and pH of nutrient solution were checked by using hand held pH and EC Meter (MCP and HANNA, respectively. The hydroponics solution consists all essential (Macro and micro) nutrients. elements in nutrient solution used for growing crops was nitrogen, potassium, phosphorus, calcium, magnesium (60 ppm), Sulphur these macro nutrients were supplied in prescribe quantity in major concentration by making a stock solution. Whereas the micro nutrients Fe, zinc (3 ppm), manganese (3 ppm), copper (less than 1 ppm), boron (4 ppm), molybdenum (less than 1 ppm), sodium (less than 1 ppm) was used in different concentration. Data were recorded as Days taken of germination, growth of plant after one month, weight of whole plant at 30 DAT, 60 DAT, 90 DAT, 120 DAT, plant height, width of leaves, number of rhizomes arising from mother rhizome.



Fig; A, B. Black Turmeric Rhizome germination after 15 DAT, **C.** Growth after 20 DAT under soilless culture.

Result

Effect on days taken to germination and plant growth

The result revealed that the endangered kali haldi can be easily cultivated under soilless culture with higher production and productivity due to well availability of nutrients and protection from soilborne disease as compared to conventional farming system. The result (Fig.1) shows the germination of turmeric rhizome very fastest under soilless culture after 15 DAT. Nutrients solution supplied after the germination. The result (Fig) shows the growth of crop after 15 days. The number of rhizomes arising from mother rhizome also positively effect on production under soilless culture. The 5-7 rhizome node growth found after one moth. The maximum (20 cm) plant growth found after one month from DAT.

Effect on Yield

Yield attributes also significantly varies under soilless cultivation as compared to conventionally farming. The maximum yield (1-1.5 kg/plant) found under per pot. Whereas the minimum average yield was found (560 gm/plant) under per pot.

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Conclusion

Our study is concluding that the Black turmeric can be easily cultivated under soilless culture. Keeping in the view of above study Kali Haldi has ethnobotanical importance for local tribe and beneficial for economic importance. Our study is concluding a new direction insight into the species' biology and ethnobotanical importance of Endangered species thus more efforts are required for the conservation of Endangered species on a wide spatial scale. This study may be beneficial for the people which facing scarcity of water availability and land shortage problem.

References

1. Al-Karaki G and AL- Hashimi Green fodder production and water use efficiency of some age crops under hydroponics conditions. Inter Scho Research Network, 2o12; 12: 1-5.
2. Agarwal, A. Om Prakash, Sahay D and Bala M. (2019). Innovative Horticulture: hydroponics (Soil-less cultivation) New Age Protected Cultivation, 5(2): 38-40.
3. Borah A., Kumar D., Manabi PAW, Begum T., Lal M. (2020). A review on ethnobotany and promising pharmacological aspects of an endangered medicinal plant, Curcuma caesia Roxb. Turkish Journal of Botany. 44: 205-213.
4. N. Behar, K.L. Tiwari, S.K. Jadhav (2014). A review on non-conventional turmeric (Curcuma caesia). current trends in biotechnology & pharmacy.
5. Pant, T.; Agarwal A.; Bhoj A.S.; Joshi R.P.; Om Prakash and Dwivedi, S. K. 2018. Vegetable cultivation under hydroponics in Himalayas- challenges and opportunities. Defence Life Science J., **3** (2):111-115.

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