

## ASSESSING THE CLIMATE SUITABLE REGIONS FOR CULTIVATION OF DRAGON FRUIT (*HYLOCEREUS UNDATUS*) IN INDIA

M. Srinivas Rao<sup>1</sup>, M. Chandrashekar Rao<sup>1</sup>, N. Sivaraj\*, K. Anitha<sup>2</sup>, Babu Abraham<sup>2</sup>, B. Parameswari<sup>2</sup>, Bhaskar Bajar<sup>2</sup> and Prasanna Holajjer<sup>2</sup>

<sup>1</sup>Deccan Exotics India Producer Company Limited (Farmer Producing Organisation, Aliyabad, Kondapur Mandal, Sangareddy district 502 306, Telangana, India

<sup>2</sup>ICAR-National Bureau of Plant Genetic Resources, Regional Station, Hyderabad 50030, Telangana, India

Email: [srinu.madhavaram@gmail.com](mailto:srinu.madhavaram@gmail.com)

Received-03.09.2021, Revised-13.09.2021, Accepted-25.09.2021

**Abstract:** Dragon fruit (*Hylocereus undatus*) is a promising exotic horticultural crop in India. It is grown in tropical and subtropical regions around the globe in South East Asia, Africa, Central and South America. Ecological niche modelling studies using the maximum entropy approach has been used to assess the suitable dragon fruit growing regions in India. Dataset for dragon fruit presence locations (91) was obtained from various sources. WorldClim dataset representing current and future climate was downloaded from <http://www.worldclim.org>. Dragon fruit presence locations dataset and WorldClim dataset were used with Maximum entropy (MaxEnt) modelling to generate the climate suitability map to show potential cultivation sites in India. The generated maps indicated that potential regions for cultivation of dragon fruit exists in several states of India viz., Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Puducherry, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, West Bengal. The potential island regions identified are Andaman and Nicobar Islands.

**Keywords:** Dragon fruit, *Hylocereus undatus*, Ecological Niche Modelling, DIVA-GIS

### REFERENCES

**Abirami, K., Swain S, Baskaran, V., Venkatesan, K. Sakthivel, K. and Bommayasamy, N.** (2021). Distinguishing three Dragon fruit (*Hylocereus* spp.) species grown in Andaman and Nicobar Islands of India using morphological, biochemical and molecular traits. *Sci Rep* **11**, 2894 <https://doi.org/10.1038/s41598-021-81682-x>.

**Addeo, A. G., Guastadisegni, G. and Pisante, N.** (2001). Land and water quality for sustainable and precision farming. In: *Proc 1<sup>st</sup> World Congress on Sustainable Agriculture*, Madrid pp. 1-4.

**Arivalagan, M., Karunakaran, G. Roy, T.K., Dinsha, M., Sindhu, B.C., Shilpashree, V. M., Satisha, G.C and Shivashankara, K.S.** (2021). Biochemical and nutritional characterization of dragon fruit (*Hylocereus* species). *Food Chemistry* **353**, 129426

**Betancur, J. A., Muriel, S. B. & González, E. P.** (2020). Morphological characterization of the red dragon fruit—*Selenicereus undatus* (Haw.) D.R. Hunt—under growing conditions in the municipality of San Jerónimo (Antioquia, Colombia). *Rev. Fac. Nac. Agron. Medellín*. **73(1)**, 9019–9027.

**Easterling, W. E., Crosson, P. R., Rosenberg, N. J., McKenny, M. S., Katz, L. A. and Lemon, K. M.** (1993). Agricultural impacts of and responses to climate-change in the Missouri- Iowa- Nebraska-Kansas (MINK) region. *Climatic Change* **24**: 23-61.

**Karunakaran, G. and M. Arivalagan** (2019). Dragon Fruit - A New Introduction Crop with Promising market. *Indian Horticulture* **63(1)**:8-11

**Le Bellec, F., Vaillant, F. and Imbert, E.** (2006). Pitahaya (*Hylocereus* spp.): A new fruit crop, a market with a future. *Fruits*, **61**:237–25

**Maji, A.K., Obi Reddy, G.P. and Sarkar, N.D.** (2010) *Degraded and wastelands of India: Status and spatial distribution*. Project Director, Directorate of Information and Publications of Agriculture. Krishi Anusandhan Bhavan-I, New Delhi P.155.

**Mizrahi, Y.** (2020). Do We Need New Crops for Arid Regions? A Review of Fruit Species Domestication in Israel. *Agronomy*, **10**: 1995.

**Parthasarathy, U., Johnny, A. K., Jayarajan, K., and Parthasarathy, V. A.** (2007). Site suitability for turmeric production in India, a GIS interpretation. *Natural Product Radiance* **6(2)**: 142-147

**Pa'sko, P., Galanty, A., Zagrodzki, P., Luksirikul, P.; Barasch, D., Nemirowski, A. and Gorinstein, S.** (2021). Dragon Fruits as a Reservoir of Natural Polyphenolics with Chemo preventive Properties. *Molecules*, **26**, 2158. <https://doi.org/10.3390/molecules2608215>.

**Phillips, S. J., Dudik, M. and Schapire, R. E.** (2004). A Maximum Entropy Approach to Species Distribution Modeling. *Proceedings of the Twenty-First International Conference on Machine Learning*. Banff, Canada, 655-662.

**Reddy, M. T., Begum, H., Sunil, N., Pandravada, S. R. and Sivaraj, N.** (2015). Assessing Climate Suitability for Sustainable Vegetable Roselle (*Hibiscus sabdariffa* var. *sabdariffa* L.) Cultivation in India Using MaxEnt Model. *Agricultural and Biological Sciences Journal* **1(2)**: 62-7.

**Rosenzweig, C., Allen Jr, L. H., Harper, L. A.,**

\*Corresponding Author

**Hollinger, S. E. and Jones, J. W.** (1995). Climate change and Agriculture: Analysis of Potential International Impacts. ASA Special Publication Number 59, *American Society of Agronomy Inc.*, Madison, W.

**Sivaraj, N., Elangovan, M., Kamala, V., Pandravada, S. R., Pranusha, P., and Chakrabarty, S. K.** (2016). Maximum Entropy (Maxent) Approach to Sorghum Landraces Distribution Modelling. *Indian Journal of Plant Genetic Resources* **29**(1): 16-21.

**Tubiello, F. N., Donatelli, M., Rosenzweig, C. and Stockle, C. O.** (2000). Effects of climate change and elevated CO<sub>2</sub> on cropping systems: model

predictions at two Italian locations. *European Journal of Agronomy* **13**: 179-189

**Tubiello, F. N., Donatelli, M., Rosenzweig, C. and Stockle, C. O.** (2002). Effects of climate change on US crop production: simulation results using two different GCM scenarios. Part 1: Wheat, potato, maize and citrus. *Climate Research* **20**: 256-270

**Wakchaure G.C., Satish Kumar, Meena K.K., Rane, J. and Pathak, H.** (2020). *Dragon Fruit Cultivation in India: Scope, Marketing, Constraints and Policy Issues*. Technical Bulletin No. 46. ICAR–National Institute of Abiotic Stress Management, Baramati, Pune, Maharashtra, India, p.54.