





















#### IV. CONCLUSION

The data analysis helps to understand crop production patterns in India by season and region. The study covers crop production in Indian states from 1997 to 2014. Climate has a huge effect on crop production. The Kharif and Rabi seasons have more products than the other seasons. During the Kharif season, the largest portion of the agricultural plot is involved, yielding the most produce compared to the other seasons. In the Kharif season, 95951 hectares of land were cultivated, yielding 94283 tons of crop production. The Rabi season has 66987 hectares of cultivable land, producing 66160 tons of crops. During the Kharif and Rabi seasons, a wider range of crops are grown. Among all Indian states, Uttar Pradesh has the highest crop production, followed by Madhya Pradesh, Karnataka, Bihar, and Assam. Pulses and cereals are the most popular products that can help meet the increasing population's nutritional needs. In the future, the most recent year's data will be used to conduct research that will aid a farmer's decision-making.

#### REFERENCES

- [1] E. Han, A. V. M. Ines, and W. E. Baethgen, "Climate-Agriculture-Modeling and Decision Tool (CAMDT): A software framework for climate risk management in agriculture," *Environ. Model. Softw.*, vol. 95, pp. 102–114, 2017, doi: 10.1016/j.envsoft.2017.06.024.
- [2] A. Tesfaye, J. Hansen, G. T. Kassie, M. Radeny, and D. Solomon, "Estimating the economic value of climate services for strengthening resilience of smallholder farmers to climate risks in Ethiopia: A choice experiment approach," *Ecol. Econ.*, vol. 162, no. November 2018, pp. 157–168, 2019, doi: 10.1016/j.ecolecon.2019.04.019.
- [3] A. Honecker *et al.*, "Plant, space and time - Linked together in an integrative and scalable data management system for phenomic approaches in agronomic field trials," *Plant Methods*, vol. 16, no. 1, pp. 1–13, 2020, doi: 10.1186/s13007-020-00596-3.
- [4] R. Guntukula, "Assessing the impact of climate change on Indian agriculture: Evidence from major crop yields," *J. Public Aff.*, vol. 20, no. 1, pp. 1–7, 2020, doi: 10.1002/pa.2040.
- [5] F. Ramírez and J. Kallarackal, "The phenology and potential ecological associations of Magenta Lilly Pilly (*Syzygium paniculatum* Gaertn) a native vulnerable Australian tree growing in Bogotá, Colombia," *Arboric. J.*, vol. 41, no. 4, pp. 191–211, 2019, doi: 10.1080/03071375.2019.1642047.
- [6] N. Budiharti and I. N. G. Wardana, "Utilization of plantation land for increasing Indonesian soybean production," *IOP Conf. Ser. Earth Environ. Sci.*, vol. 472, no. 1, pp. 0–8, 2020, doi: 10.1088/1755-1315/472/1/012037.
- [7] D. Pauli *et al.*, "The quest for understanding phenotypic variation via integrated approaches in the field environment," *Plant Physiol.*, vol. 172, no. 2, pp. 622–634, 2016, doi: 10.1104/pp.16.00592.
- [8] S. Faghieh, Z. Zamani, R. Fatahi, and M. Omid, "Influence of kaolin application on most important fruit and leaf characteristics of two apple cultivars under sustained deficit irrigation," *Biol. Res.*, vol. 54, no. 1, pp. 1–15, 2021, doi: 10.1186/s40659-020-00325-z.
- [9] K. Balyan, S. Kumar, V. P. Chahal, and S. Kumar, "Dynamics of Indian fresh mango export," *Indian J. Agric. Sci.*, vol. 85, no. 11, pp. 1466–1471, 2015.
- [10] R. Singh, M. K. Singh, A. K. Singh, C. Singh, and K. Singh, "Pulses production in India: Issues and elucidations," *Pharma Innov. J.*, vol. 7, no. 1, pp. 10–13, 2018, [Online]. Available: <http://www.iipr.res.in/pe/introduction.asp>.
- [11] P. V. Kumar *et al.*, "Algorithms for Weather Based Management Decisions in Major Rainfed Crops of India: Validation Using Data from Multi-location Field Experiments," *Agron. J.*, 2020, doi: 10.1002/its2.20518.This.
- [12] P. S. Birthal, P. K. Joshi, S. Chauhan, and H. Singh, "Can horticulture revitalise agricultural growth?," *Indian J. Agric. Econ.*, vol. 63, no. 3, pp. 310–321, 2008.
- [13] S. Datta, "Impact of Climate Change in Indian Horticulture - a Review," *Int. J. Sci. Environ. Technol.*, vol. 2, no. 4, pp. 661–671, 2013.
- [14] C. Juhász, B. Gálya, E. Kovács, A. Nagy, J. Tamás, and L. Huzsvai, "Seasonal predictability of weather and crop yield in regions of Central European continental climate," *Comput. Electron. Agric.*, vol. 173, no. June 2019, p. 105400, 2020, doi: 10.1016/j.compag.2020.105400.
- [15] S. Khaki and L. Wang, "Crop yield prediction using deep neural networks," *Front. Plant Sci.*, vol. 10, no. May, pp. 1–10, 2019, doi: 10.3389/fpls.2019.00621.
- [16] Divyosmi Goswami, "crop production dataset," 2020. <https://www.kaggle.com/divyosmi2009/crop-production-in-india-statewise>.
- [17] M. M. Nageswararao, B. S. Dhekale, and U. C. Mohanty, "Impact of climate variability on various Rabi crops over Northwest India," *Theor. Appl. Climatol.*, vol. 131, no. 1–2, pp. 503–521, 2018, doi: 10.1007/s00704-016-1991-7.
- [18] S. K. Malhotra, "Horticultural crops and climate change: A review," *Indian J. Agric. Sci.*, vol. 87, no. 1, pp. 12–22, 2017.
- [19] A. K. Singh and P. Sharma, "Measuring the productivity of food-grain crops in different climate change scenarios in India: An evidence from time series investigation," vol. 4, no. 16, 2018, [Online]. Available: [www.discoveryjournals.org](http://www.discoveryjournals.org).
- [20] K. F. Davis, A. Chhatre, N. D. Rao, D. Singh, and R. Defries, "Sensitivity of grain yields to historical climate variability in India," *Environ. Res. Lett.*, vol. 14, no. 6, 2019, doi: 10.1088/1748-9326/ab22db.
- [21] S. M. Kelkar, A. Kulkarni, and K. K. Rao, "Impact of climate variability and change on crop production in Maharashtra, India," *Curr. Sci.*, vol. 118, no. 8, pp. 1235–1245, 2020, doi: 10.18520/cs/v118/i8/1235-1245.
- [22] T. Sharma, H. Vittal, S. Karmakar, and S. Ghosh, "Increasing agricultural risk to hydro-climatic extremes in India," *Environ. Res. Lett.*, vol. 15, no. 3, 2020, doi: 10.1088/1748-9326/ab63e1.
- [23] M. Chozin, S. Sudjarmiko, Z. Muktamar, N. Setyowati, and F. Fahrurrozi, "Performances and genetic parameters estimation of yield and yield related traits in sweet corn inbred lines selected for better adaptation to organic cropping system," *Int. J. Adv. Sci. Eng. Inf. Technol.*, vol. 10, no. 3, pp. 1252–1257, 2020, doi: 10.18517/ijaseit.10.3.2558.