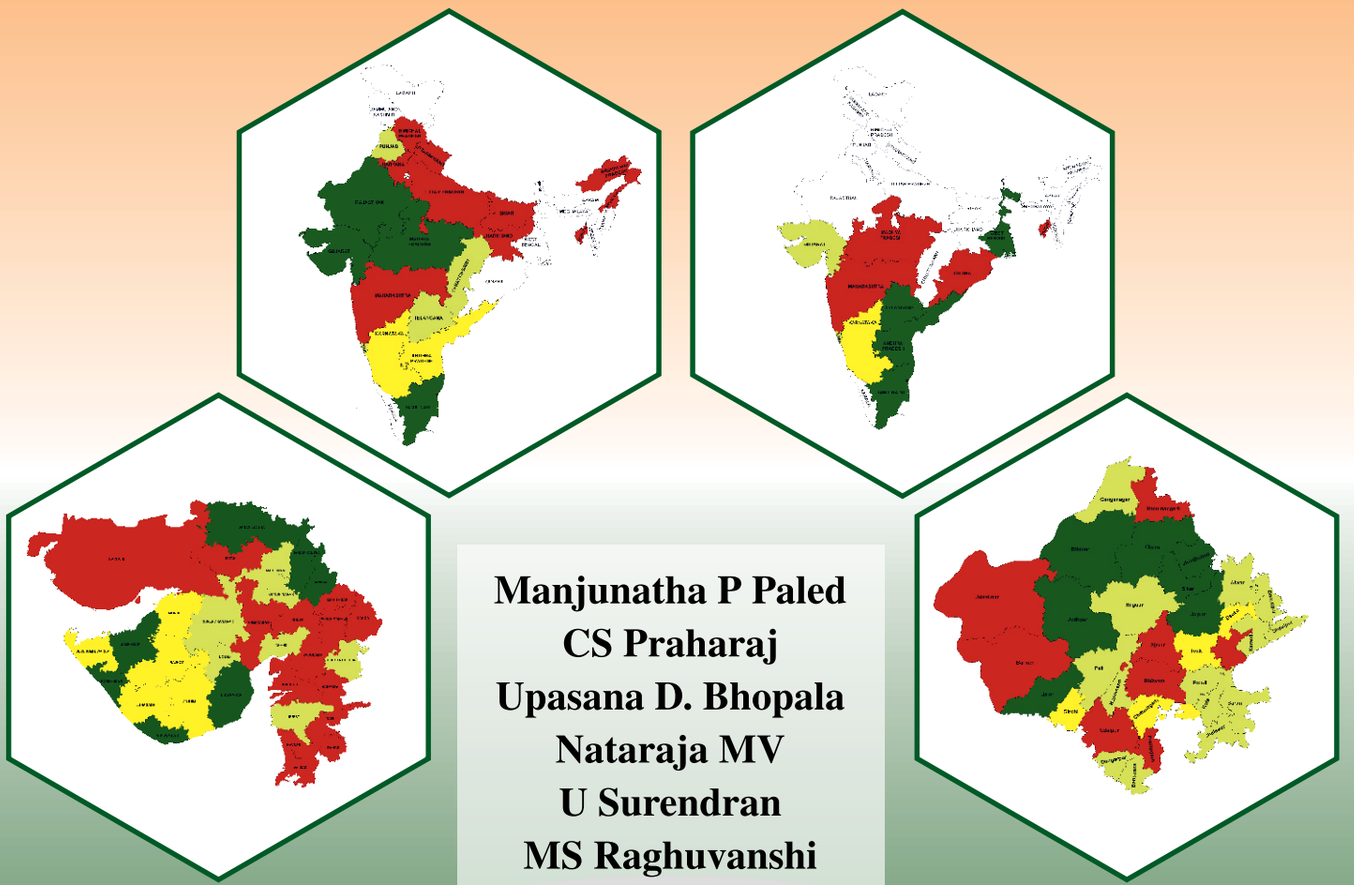
Groundnut Crop Atlas: A Guide for Policy and Practice



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Preface

Groundnut (Arachis hypogaea L.) is a vital oilseed crop in India, contributing significantly to the country's edible oil production and serving as a key source of nutrition and livelihood for millions of farmers. It is believed to have originated in South America, particularly in regions of Brazil and Peru, before spreading to other parts of the world. It is widely cultivated in many tropical and sub-tropical countries. Groundnut known for its nutritional value as its kernel contains considerable amount of oil (40-53%) and protein (24-36%) along with minerals (P, Ca, Mg, Fe), Vitamins (Vitamin B & E), healthy fats (monounsaturated and polyunsaturated fats) and dietary fiber making it healthy edible cooking oil. The by-products of groundnut such as cake is used as cattle feed and organic manure, shells are used as fuel, in particle board manufacturing, and as organic mulch and haulm (plant residue) is a valuable source of animal fodder. Groundnut is consumed in various forms, with its usage distributed across, oil extraction (45-50%), direct consumption (20-25%), animal feed (15-20%), industrial use (5-10%) and seed purpose (5-7%).

India is the second-largest producer of groundnuts after China. In India the major groundnut growing states include Gujarat, Rajasthan, Andhra Pradesh, Tamil Nadu, Karnataka, Madhya Pradesh, Maharashtra and Telangana. Groundnut is cultivated in all three seasons depending on the region and availability of irrigation with *kharif* being the major season. In India, during 2023-24, the area under groundnut is 4.71 million hectares, with production of 10.18 million tonnes at an average yield of 2163 kg/ha. The states such as Gujarat, Rajasthan, Madhya Pradesh, Tamil Nadu and Andhra Pradesh together contribute about 87% to the national production with about 79% area with Gujarat alone contributing about 46 per cent to production with only 36% area. Among leading groundnut producing states, highest productivity is seen in West Bengal (3060 kg/ha), Gujarat (2739 kg/ha), Tamil Nadu (2694 kg/ha).

A Crop Atlas helps in identifying efficient cropping zones by analyzing area, productivity. Using a Crop Atlas for groundnut cultivation enables identifying suitability of groundnut crop and varieties to the particular region thereby helps in taking up proper intervention such as development of location specific varieties, area expansion measures and/or varietal introduction to enhance groundnut production, productivity and ultimately farmer's income.

The bulletin will act as source of information for various stakeholders in making informed decisions such as site-specific groundnut farming practices, resource management, and strategic planning to enhance production efficiency and climate resilience. We hope that this document will contribute to the sustainable growth of India's groundnut sector and support efforts toward achieving food and nutritional security.

We sincerely acknowledge the contributions of Director and scientists of ICAR-IIGR, Junagadh for their valuable suggestions and ICAR-NBSS & LUP, Nagpur in preparation of maps and this bulletin. Their collective expertise has been instrumental in developing a robust and data-driven resource for the benefit of the groundnut community.

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Groundnut Crop Atlas

Meaning and Scope

The Groundnut Crop Atlas is a comprehensive resource detailing various aspects of groundnut (peanut) cultivation, including geographical distribution, area and productivity trends *etc*. A Groundnut Crop Atlas serves as a vital tool for policymakers, agricultural planners, and practitioners by providing comprehensive insights into groundnut cultivation.

Main objectives of Groundnut Crop Atlas

1. To identifying and mapping groundnut-growing regions

- Delineate agro-climatic zones suitable for groundnut cultivation.
- Identify high-yielding zones and low-productivity areas for targeted interventions.

2. To support policy formulation and decision-making

- Provide data-driven insights to design subsidy programs, insurance schemes, and support policies for farmers.
- Guide minimum support price (MSP) policies by assessing production trends and supply-demand dynamics.

3. To enhance agricultural planning and resource allocation

- Optimize the distribution of seeds, fertilizers, and irrigation facilities in key groundnut-growing zones.
- Assist in developing zonal recommendations for best agronomic practices.

4. Facilitating Research and Development (R&D)

- Assist researchers in developing climate-resilient groundnut varieties suited for different zones.
- Provide a database for breeding programs and genetic improvement initiatives.
- Encourage innovation in precision farming, mechanization, and soil health improvement techniques.

Relevance to Policymakers, Agricultural Planners, and Practitioners

Policymakers can use the atlas to design evidence-based agricultural policies that ensure food security and farmer welfare. Agricultural Planners can leverage the data

to optimize resource allocation and develop regional production strategies. Practitioners (farmers, breeders, extension officers, agribusinesses) can use it for better farm management, risk mitigation, and yield improvement.

Importance of Groundnut Cultivation

Groundnut (*Arachis hypogaea* L.) an essential oil, food, and forage crop, is found in tropical, subtropical and warm temperate zones. It is one of the most important food and cash crops of our country. While being a valuable source of all the nutrients, it is a low-priced commodity. Hence it is also called as wonder nut and poor men's cashew nut.

Agro-Climatic Requirements of Groundnut Crop in India

Groundnut (*Arachis hypogaea*) is a climate-sensitive crop that thrives under specific **temperature, rainfall, and soil conditions**. The following are the key **agro-climatic requirements** essential for optimal groundnut cultivation in India:

1. Climate Factors

a. Temperature Range

- The optimal temperature for groundnut cultivation is **20°C to 30°C**.
- Germination occurs best at **25°C to 30°C**, while flowering and pod development require **25°C to 28°C**.
- High temperatures above **35°C** during the pod development stage can lead to poor yield and seed quality.

b. Rainfall Patterns

- Groundnut requires **500–1000 mm** of well-distributed rainfall during the growing season.
- Excess rainfall (>1000 mm) can cause **waterlogging**, leading to fungal diseases like **collar rot and stem rot**.

c. Humidity Levels

- Ideal relative humidity is **60% to 70%** during vegetative growth.
- High humidity (>80%) increases the risk of **fungal diseases**, while very low humidity (<40%) can cause **flower shedding** and affect pod formation.

2. Soil Characteristics

a. Suitable Soil Types

- **Sandy loam and well-drained loamy soils** are ideal for groundnut cultivation.
- Red, black, and alluvial soils with **good drainage** can also support groundnut growth.
- Heavy clay soils should be avoided as they cause **poor aeration and pod development issues**.

b. Soil pH Levels

- Groundnut prefers a **pH range of 6.0 to 7.5** for optimal growth.
- Highly acidic soils (pH < 5.5) and highly alkaline soils (pH > 8.0) negatively impact **nutrient uptake** and pod development.

c. Fertility Conditions

- **Moderate organic matter** is beneficial for healthy growth.
- Requires **adequate phosphorus (P), calcium (Ca), and magnesium (Mg)** for strong root and pod development.
- **Boron (B) and Zinc (Zn) deficiencies** can lead to reduced seed quality and yield losses.

Groundnut is best grown in **warm, moderately humid climates** with well-distributed rainfall and **light-textured, well-drained soils**. Farmers can optimize yield by selecting the right planting time and managing soil nutrients effectively.

Methodology followed for zone delineation

Data and source: In order to delineate (identify) efficient cropping zones, season-wise district as well as state level time series data (2016-17 to 2022-23) on area, production, productivity and total cultivable area was collected from Directorate of Economics and Statistics, *GoI*.

Analytical tool: Relative Spread Index (RSI) and Relative Yield Index (RYI) were calculated using below given formula.

- $\text{RSI} = \frac{\text{Area of that particular crop expressed as \% of total cultivable area in the district}}{\text{Area of that particular crop expressed as \% of total cultivable area in the state}} * 100$

- $\text{RYI} = \frac{\text{Mean yield of a particular crop in a district}}{\text{Mean yield of a particular crop in the state}} * 100$

Criteria for Delineation: Based on the average value of RSI and RYI, districts have been categorized into high and low as:

- District with RSI and RYI > Average RSI & RYI of state = **High**
- District with RSI and RYI < Average RSI & RYI of state = **Low**

RSI (Relative Spread Index)	RYI (Relative Yield Index)	Cropping Zone
High	High	Most Efficient Cropping Zone (MECZ)
Low	High	Efficient Cropping Zone (ECZ)
High	Low	Non-Efficient Cropping Zone (NECZ)
Low	Low	Highly Inefficient Cropping Zone (HICZ)

I. Groundnut Scenario in India

Table 01: Trend in area, production and yield in India

Year	*Kharif*			*Rabi*-Summer		
	Area (lakh ha)	Production (lakh tonnes)	Yield (Kg/ha)	Area (lakh ha)	Production (lakh tonnes)	Yield (Kg/ha)
2016-17	45.78	60.48	1321	7.60	14.14	1861
2017-18	41.42	75.95	1834	7.46	16.57	2222
2018-19	41.32	53.87	1304	5.99	13.40	2238
2019-20	41.60	83.89	2016	6.65	15.63	2352
2020-21	51.71	85.28	1649	8.43	17.16	2034
2021-22	49.13	84.34	1717	7.92	17.01	2147
2022-23	42.63	85.62	2009	6.98	17.35	2486
2023-24	40.44	86.60	2142	6.64	15.20	2289

a. State-wise latest scenario of *kharif* groundnut

Fig. 01: State-wise *kharif* groundnut area (TE 2024)

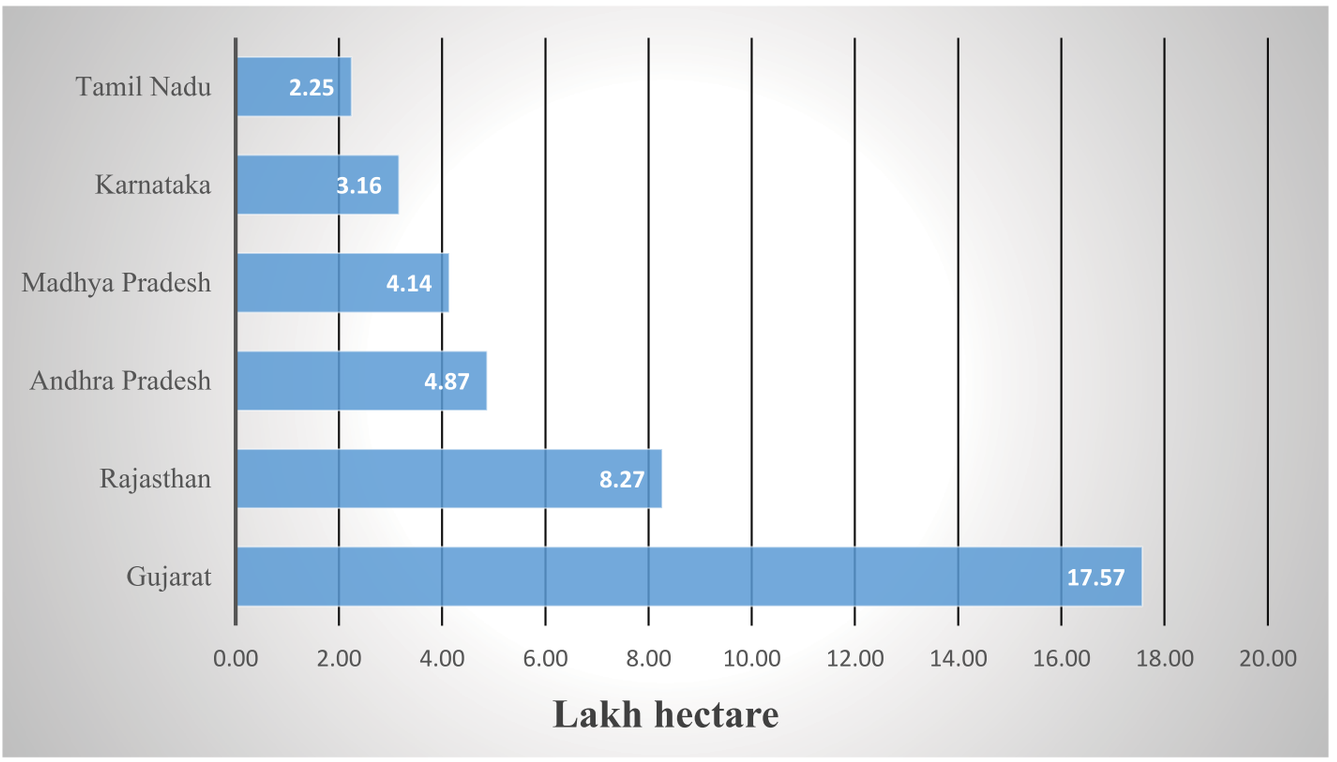


Fig. 02: Major contributing states to *kharif* groundnut area (TE 2024)

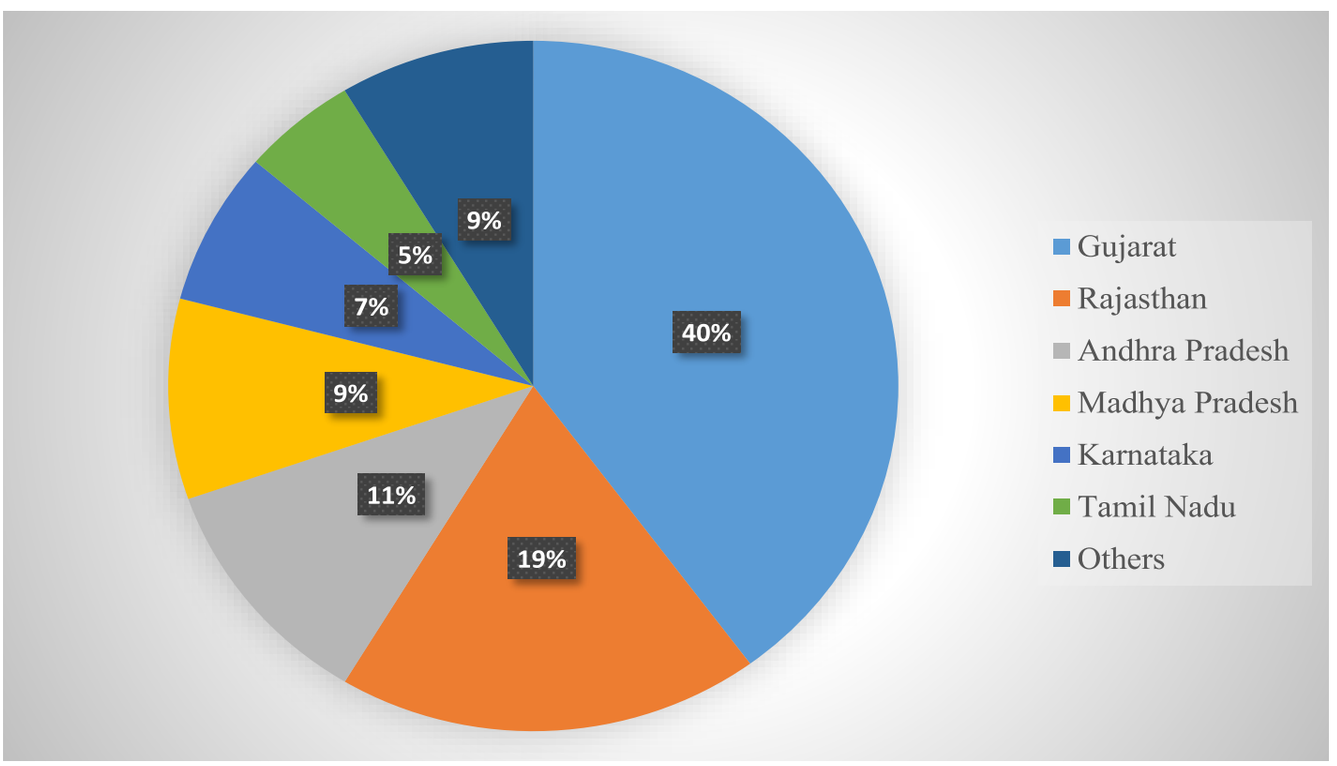


Fig. 03: State-wise *kharif* groundnut production scenario (TE 2024)

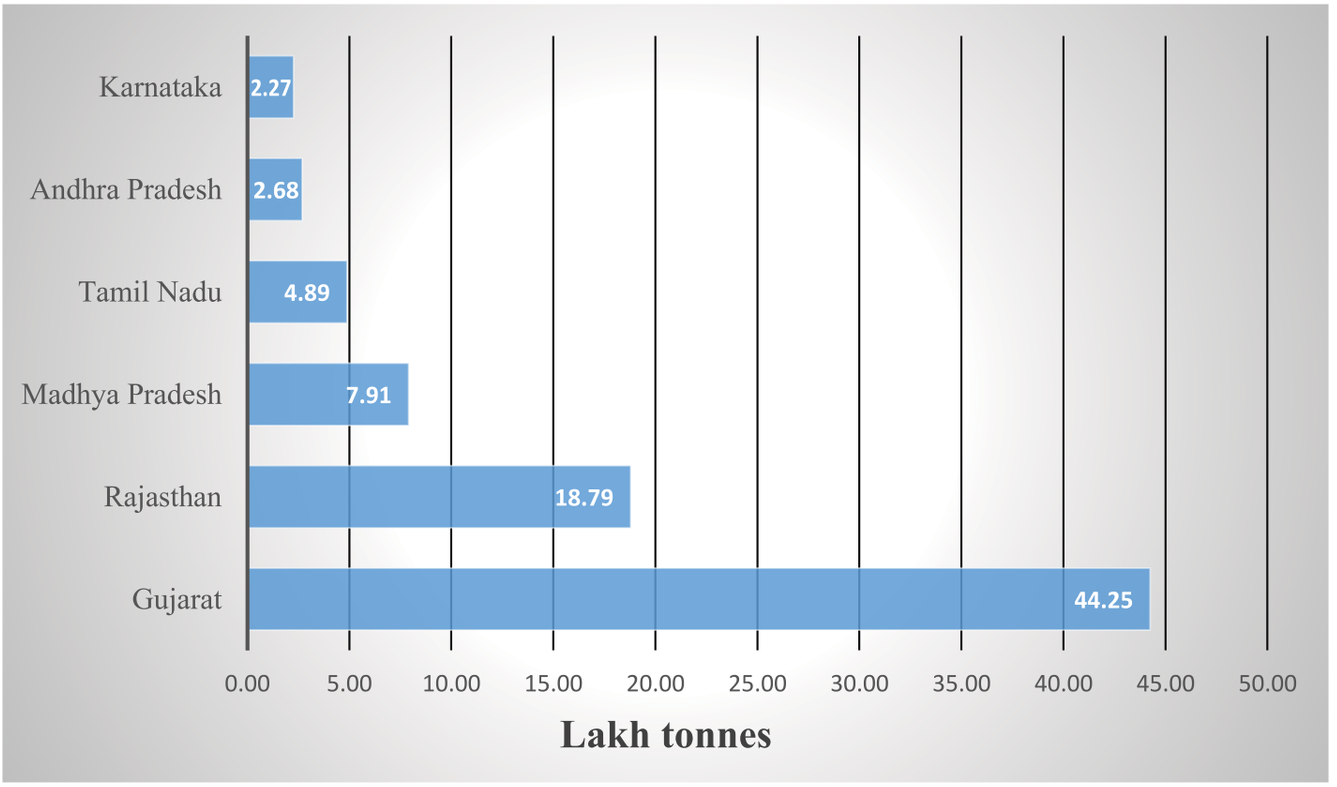


Fig. 04: Major contributing states to *kharif* groundnut production (TE 2024)

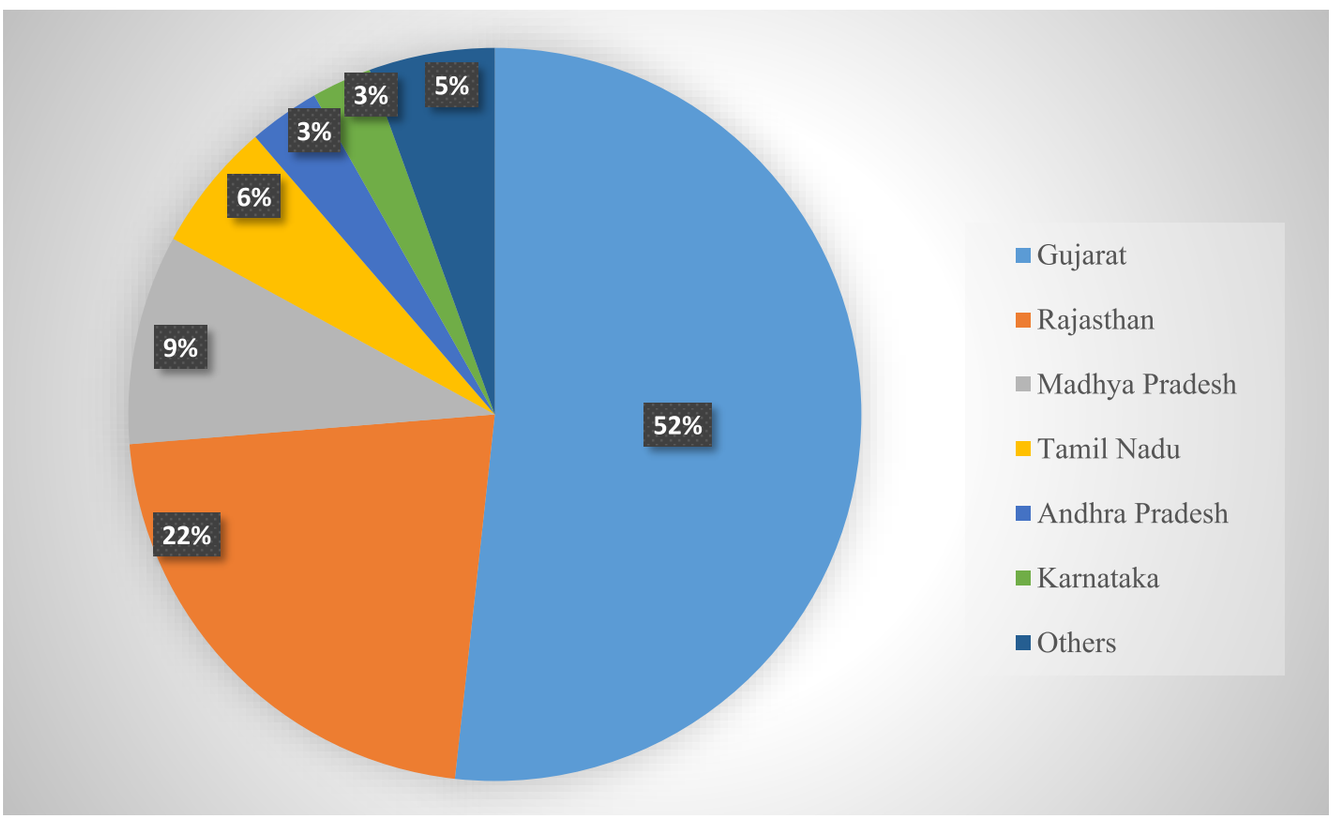


Fig. 05: State-wise *rabi*-summer groundnut area (TE 2024)

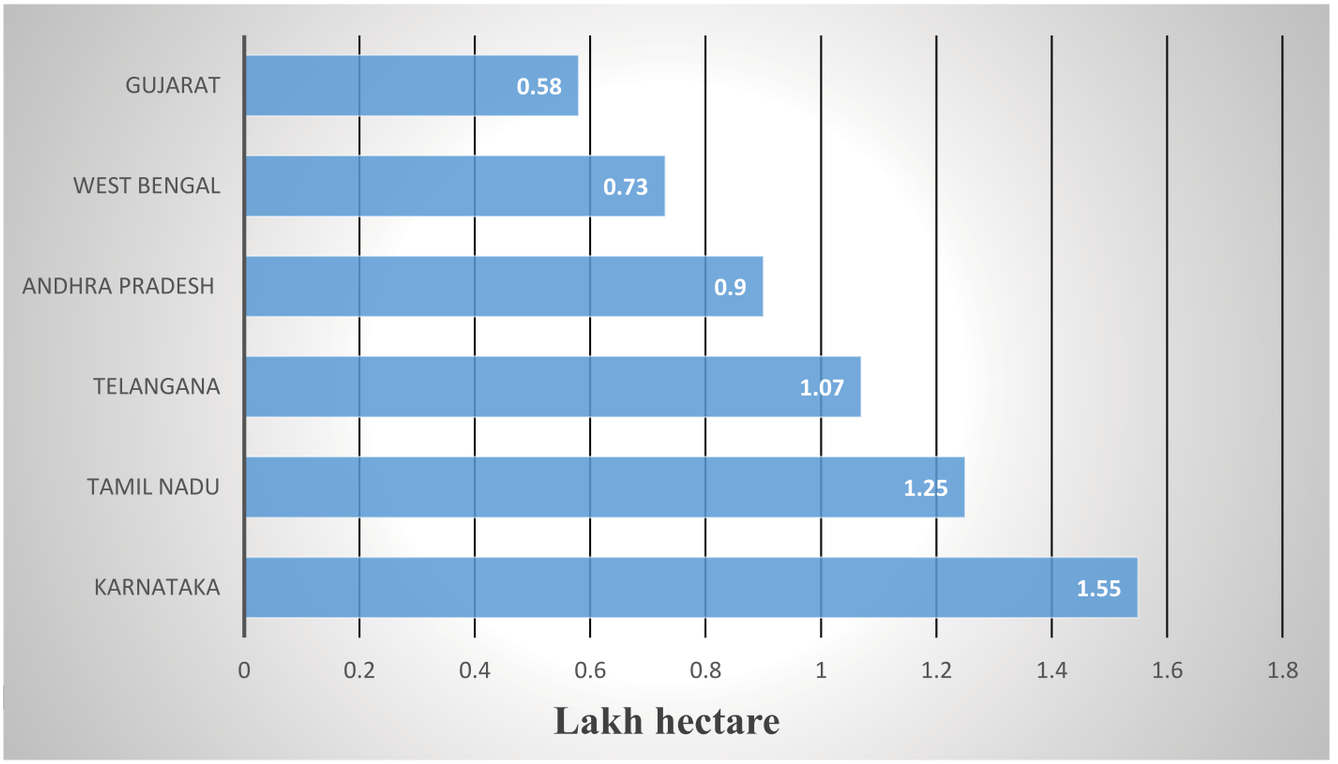


Fig. 06: Major contributing states to *rabi*-summer groundnut area (TE 2024)

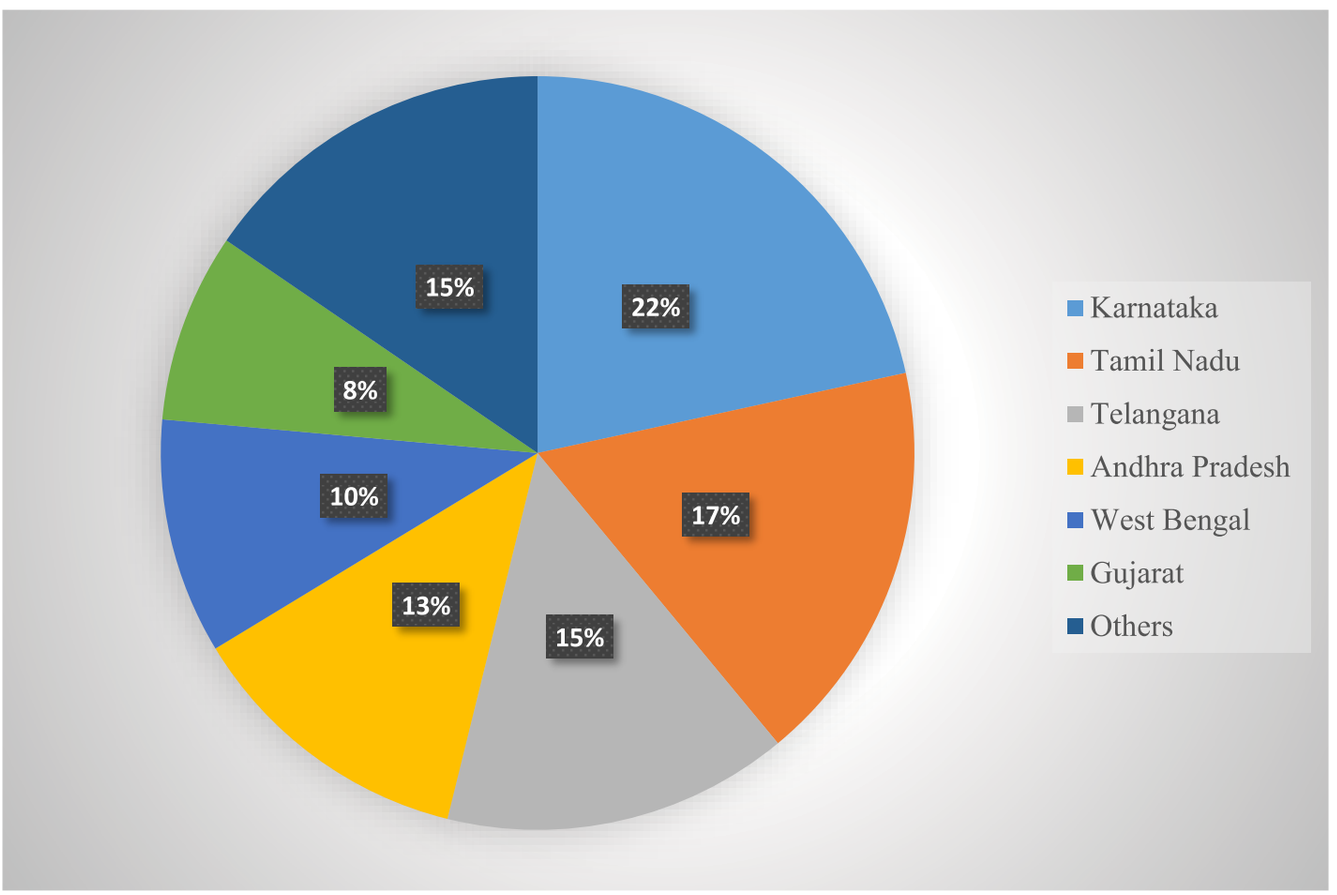


Fig. 07: State-wise *rabi*-summer groundnut production scenario (TE 2024)

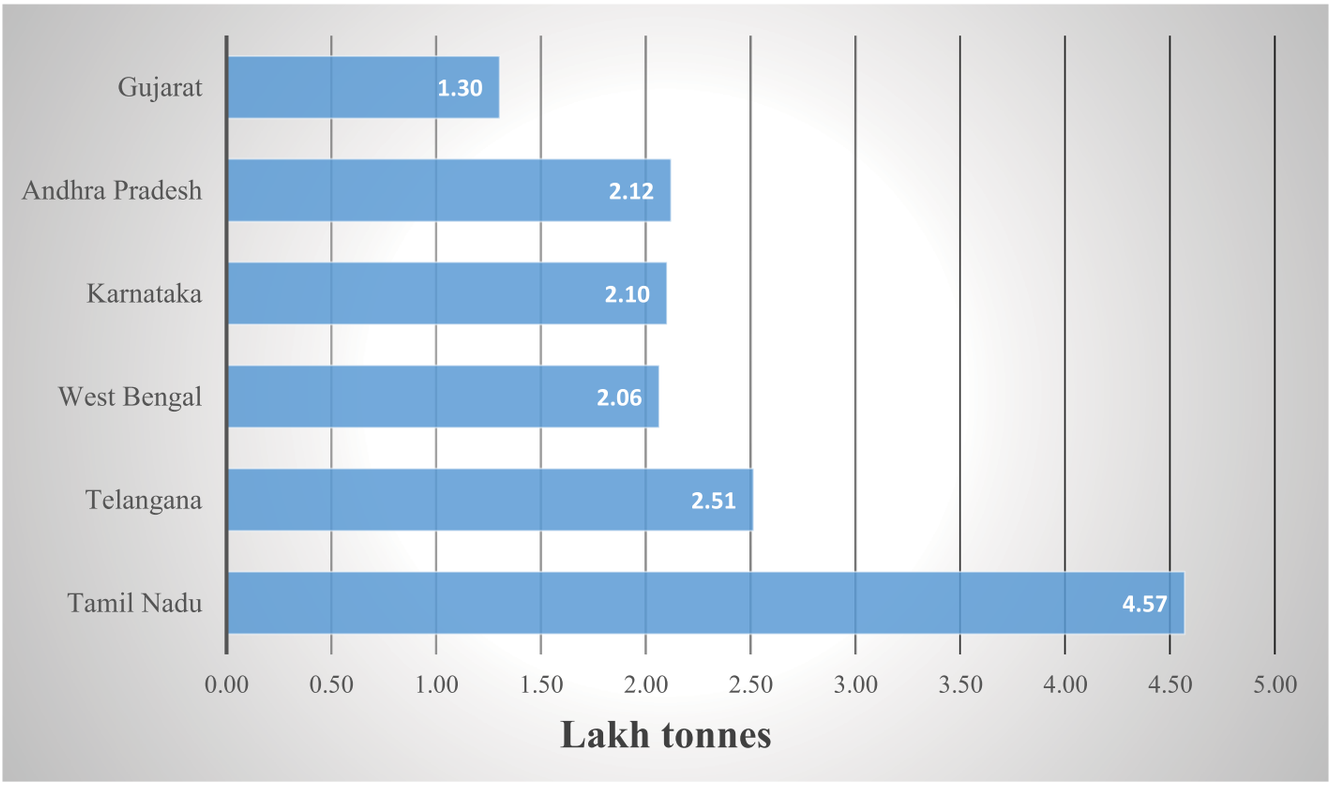


Fig. 08: Major contributing states to *rabi*-summer groundnut production (TE 2024)

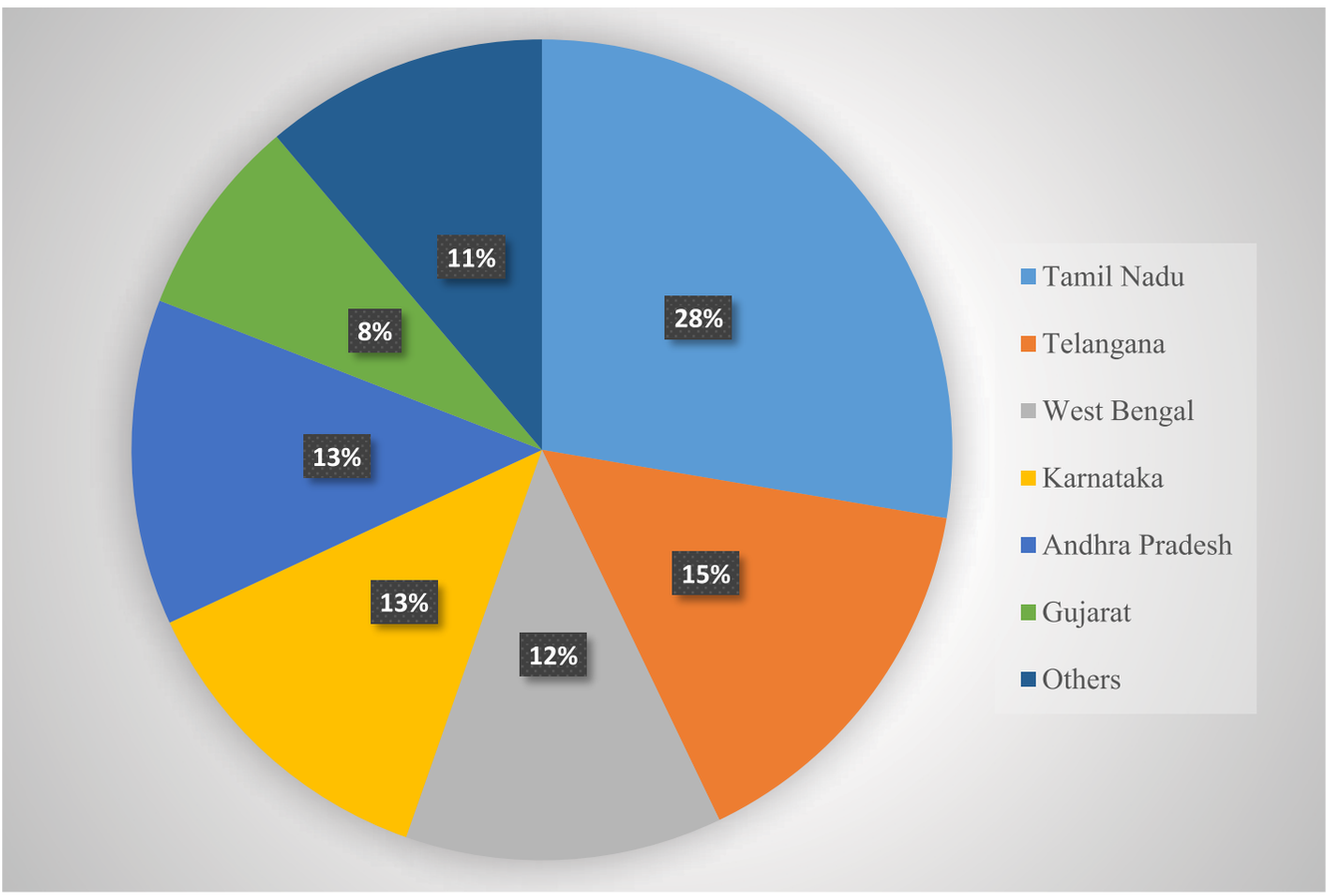


Fig. 09: States with highest groundnut productivity (*kharif)*

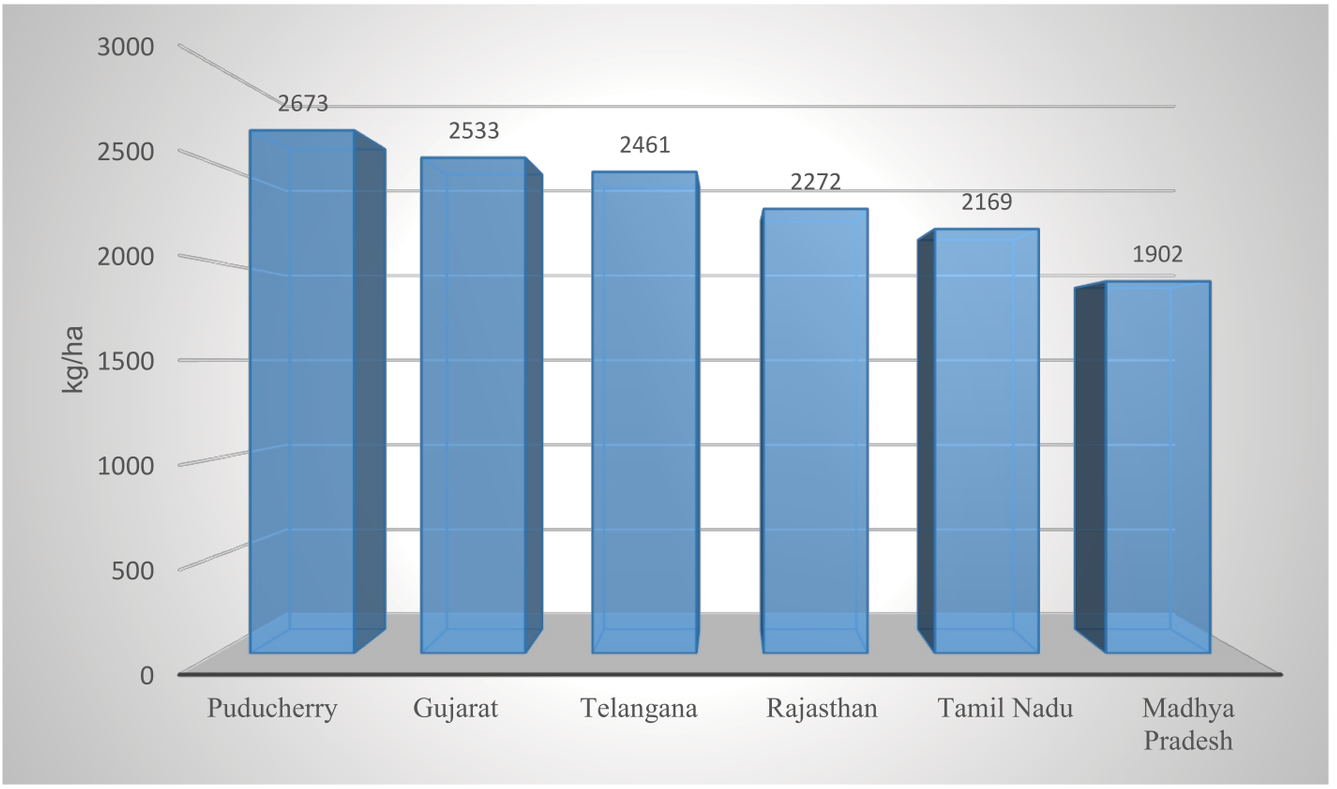


Fig. 10: States with highest groundnut productivity (*rabi*-summer)

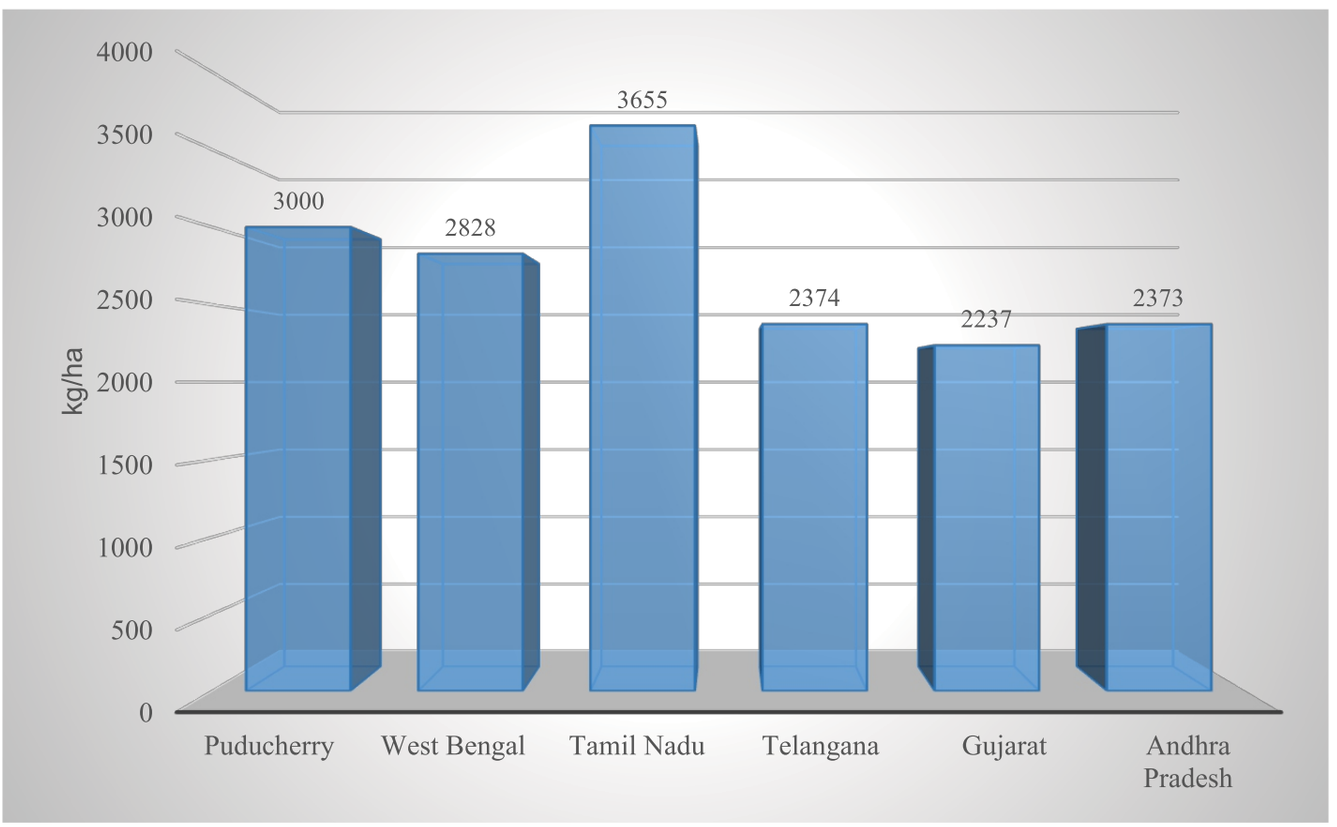
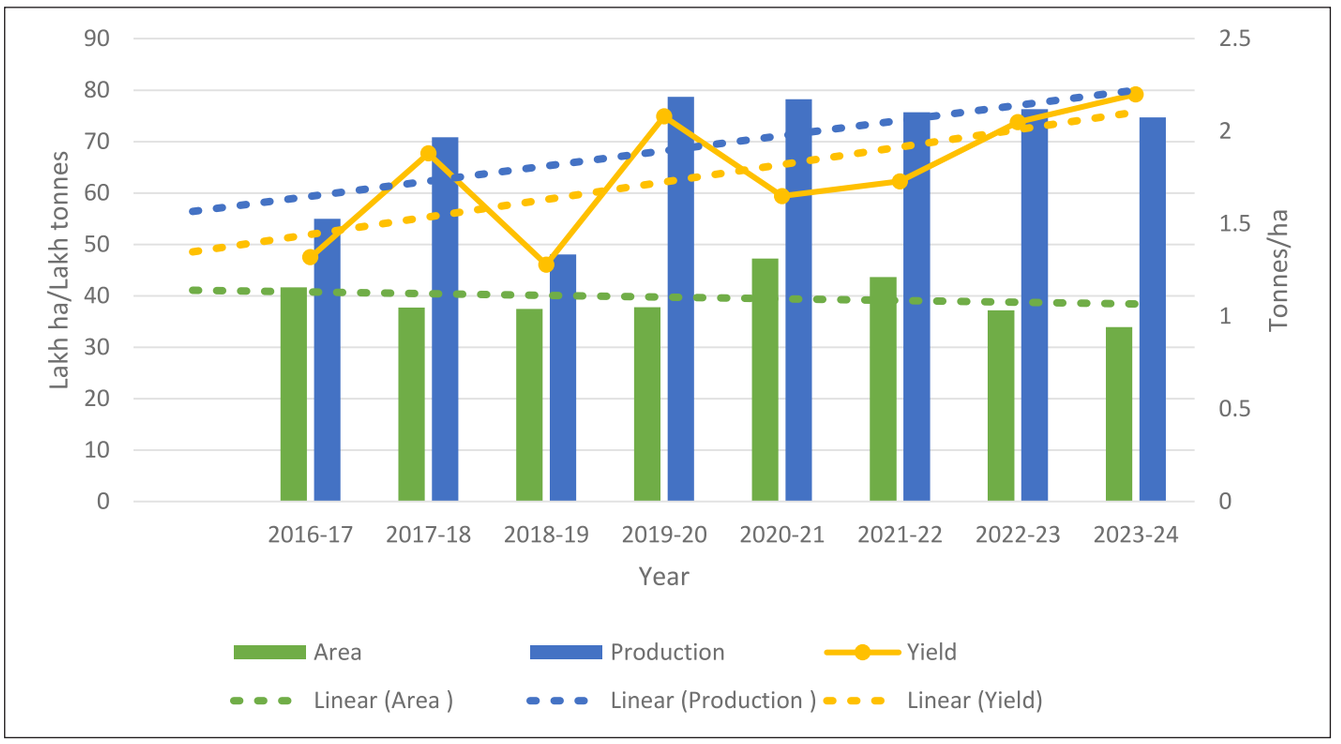
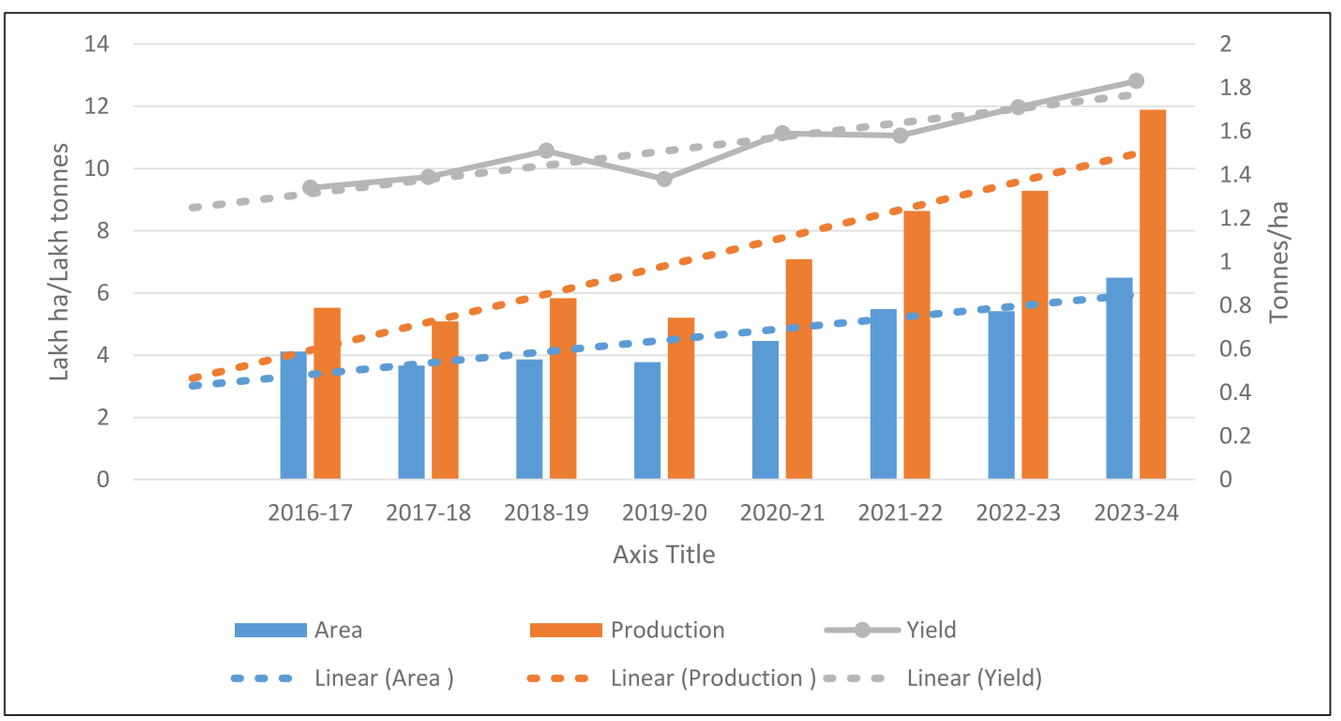


Fig. 11: Area, production and yield trend in *kharif* groundnut in traditional states



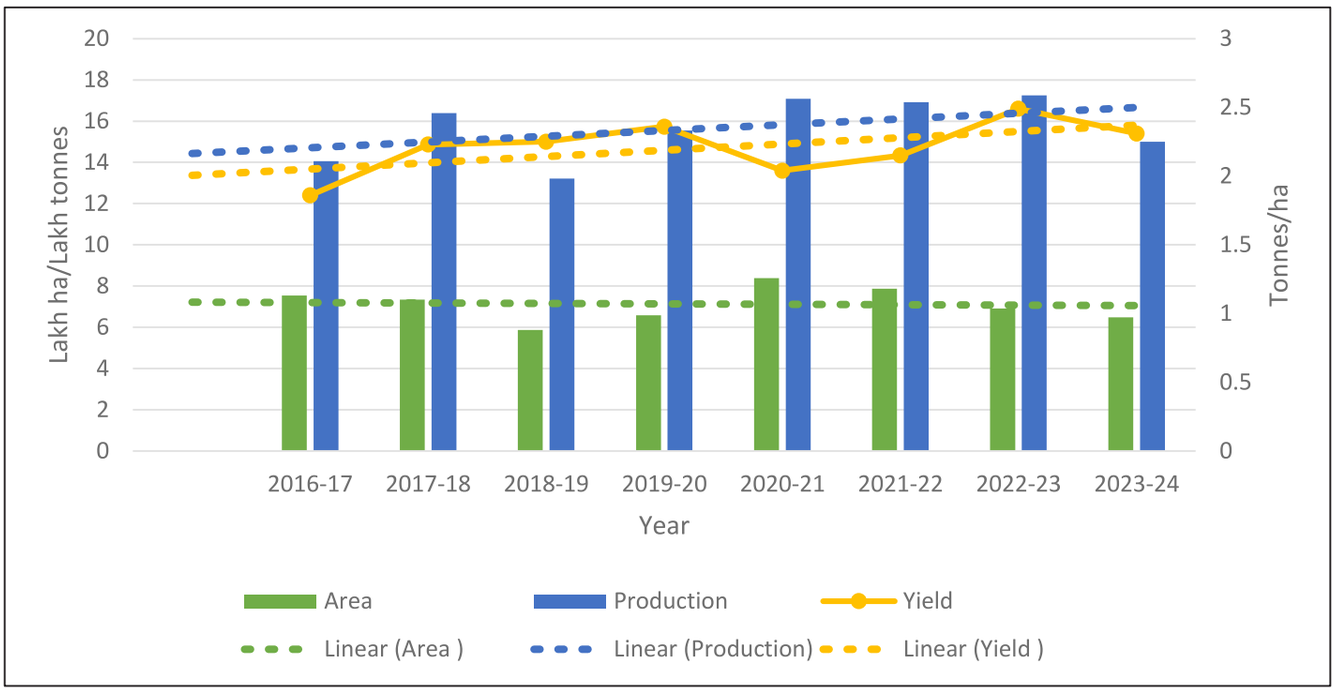
Note: *Traditional states: Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Rajasthan, Tamil Nadu, Telangana, Odisha, West Bengal*

Fig. 12: Area, production and yield trend in *kharif* groundnut in non-traditional states



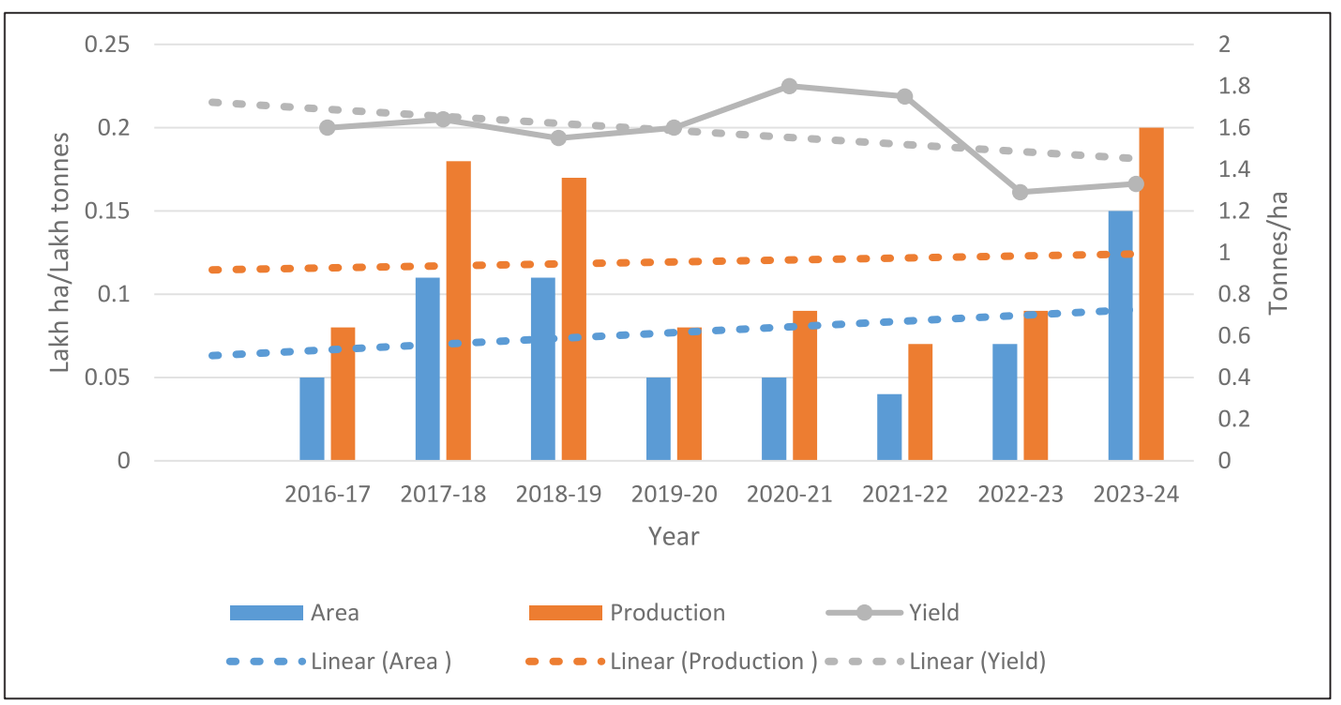
Note: *Non-traditional states: Remaining states excluding traditional states (Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Rajasthan, Tamil Nadu, Telangana, Odisha, West Bengal)*

Fig. 13: Area, production and yield trend in *rabi*-summer groundnut in traditional states



Note: *Traditional states: Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Rajasthan, Tamil Nadu, Telangana, Odisha, West Bengal*

Fig. 14: Area, production and yield trend in *rabi*-summer groundnut in non-traditional states



Note: *Non-traditional states: Remaining states excluding traditional states (Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Rajasthan, Tamil Nadu, Telangana, Odisha, West Bengal)*

Fig. 15: Trend in *kharif* groundnut in Gujarat

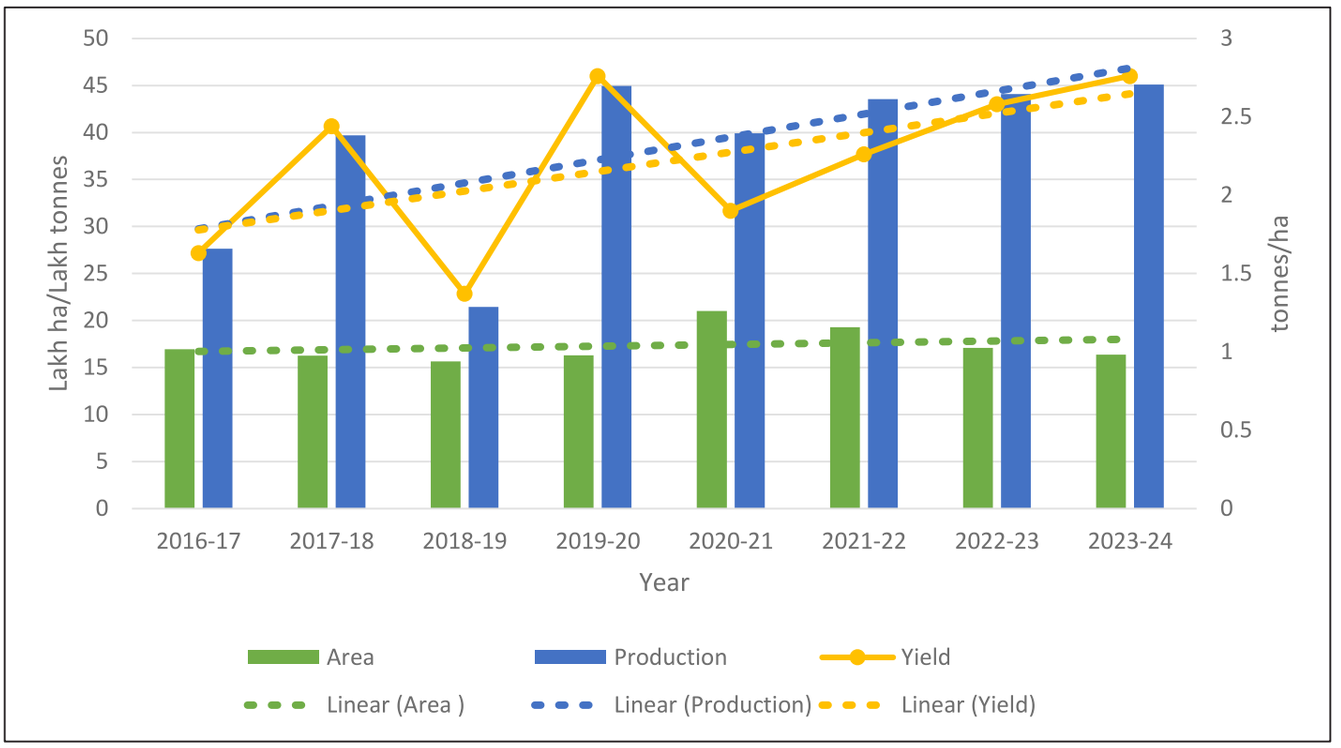


Fig. 16: Trend in *kharif* groundnut in Rajasthan

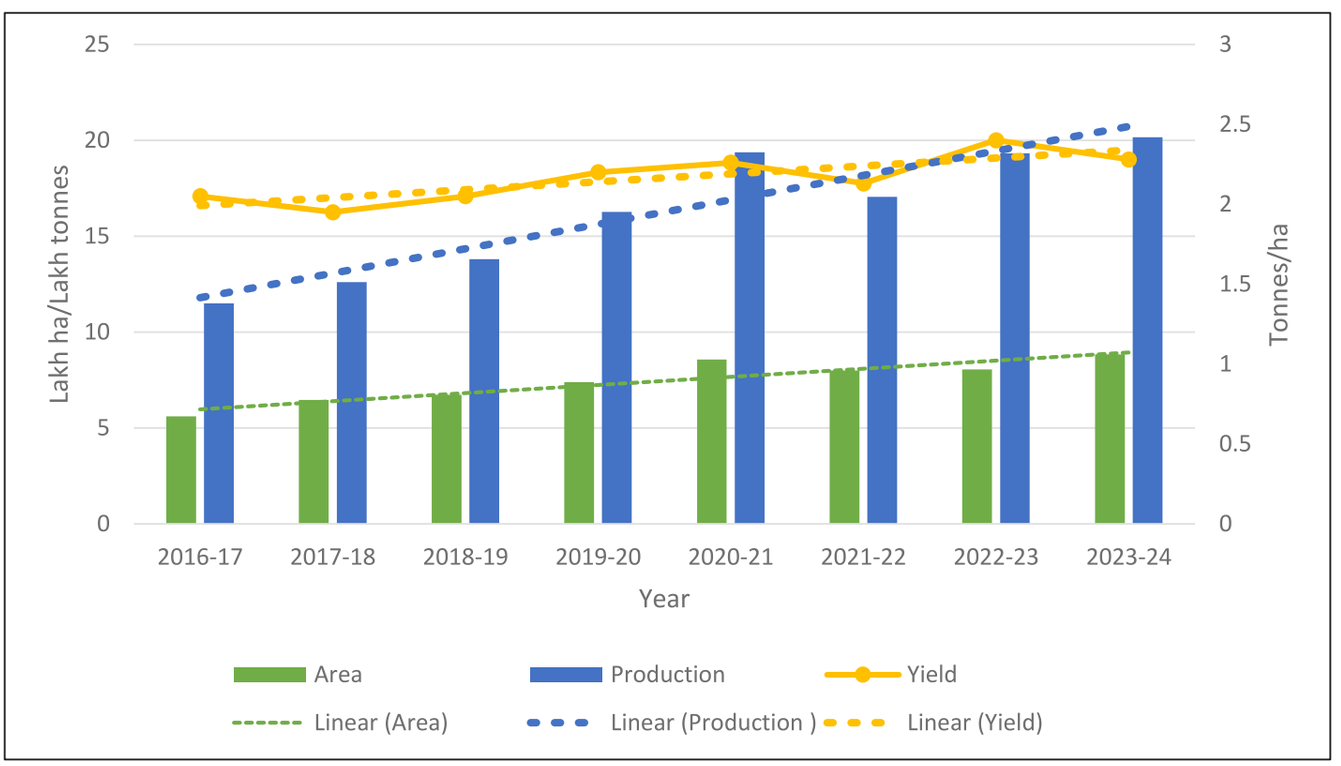


Fig. 17: Trend in *kharif* groundnut in Andhra Pradesh

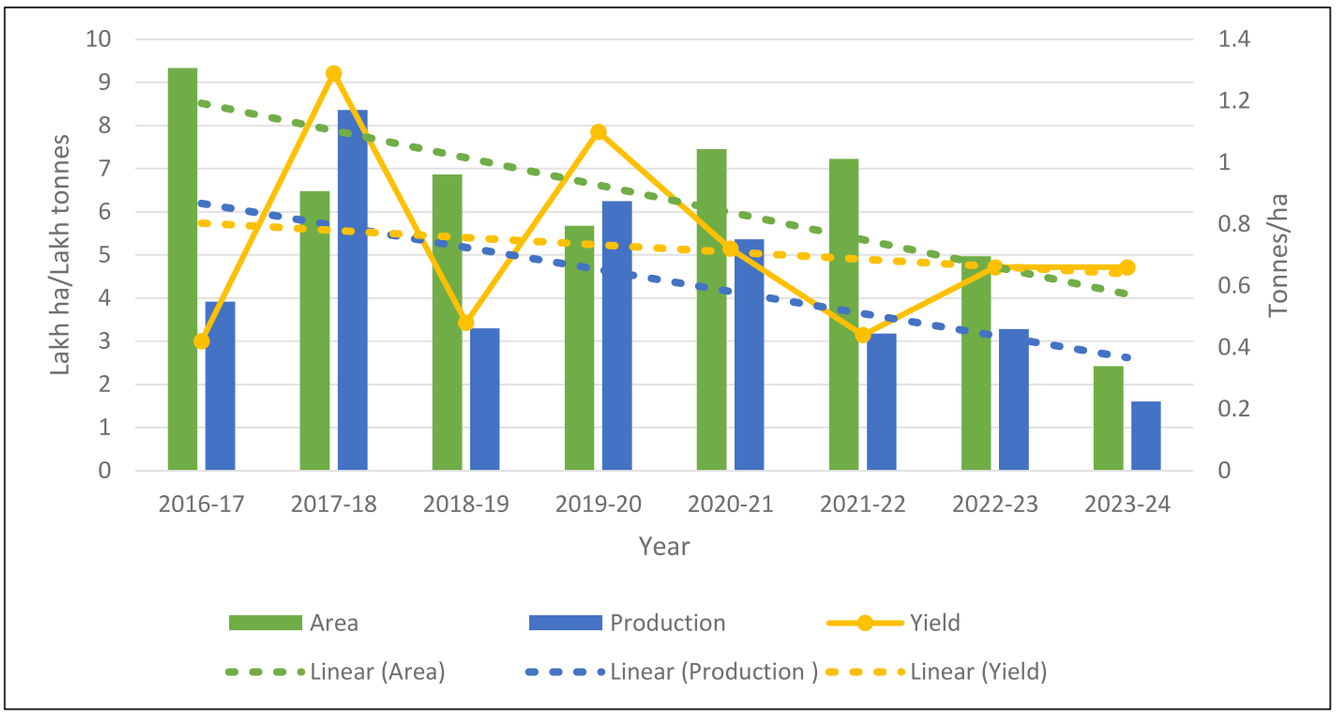


Fig. 18: Trend in *kharif* groundnut in Madhya Pradesh

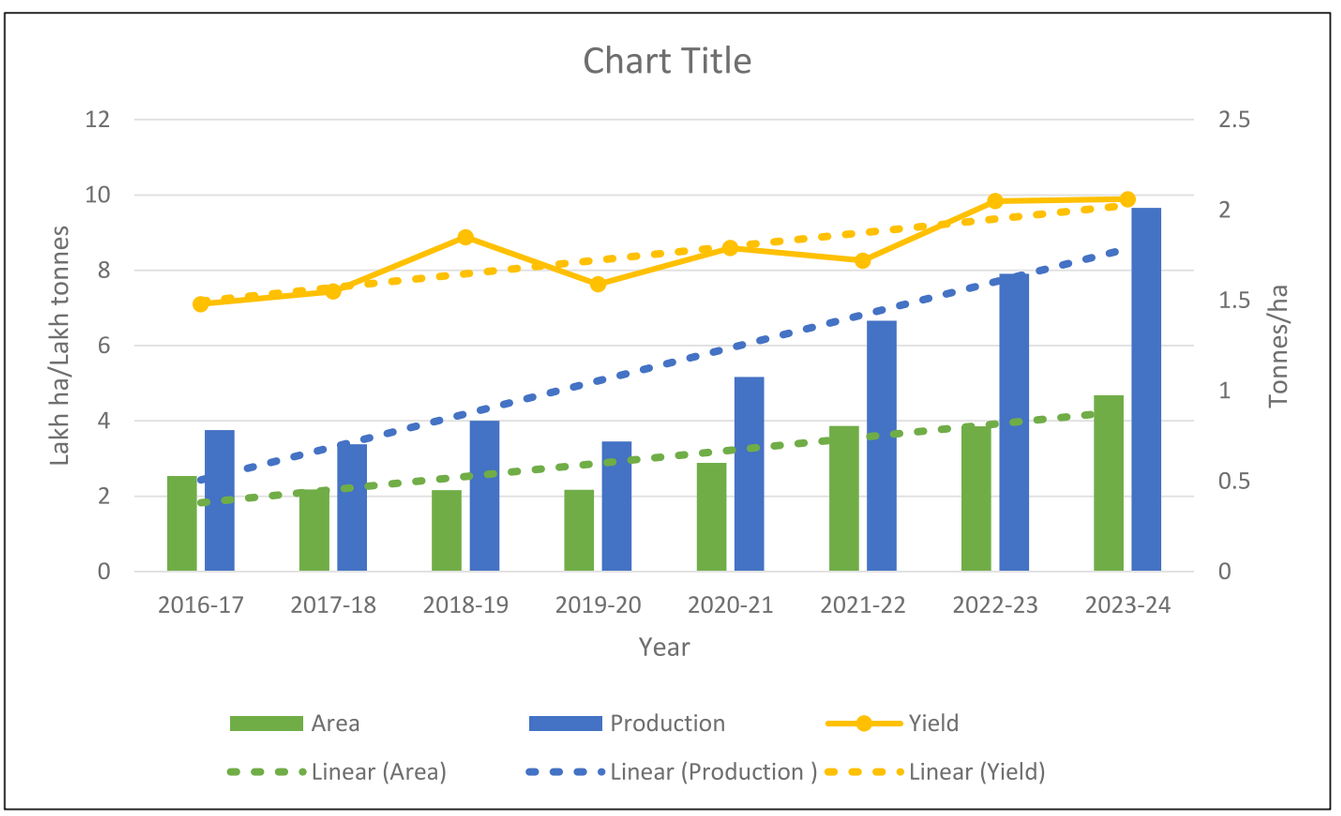


Fig. 19: Trend in *kharif* groundnut in Karnataka

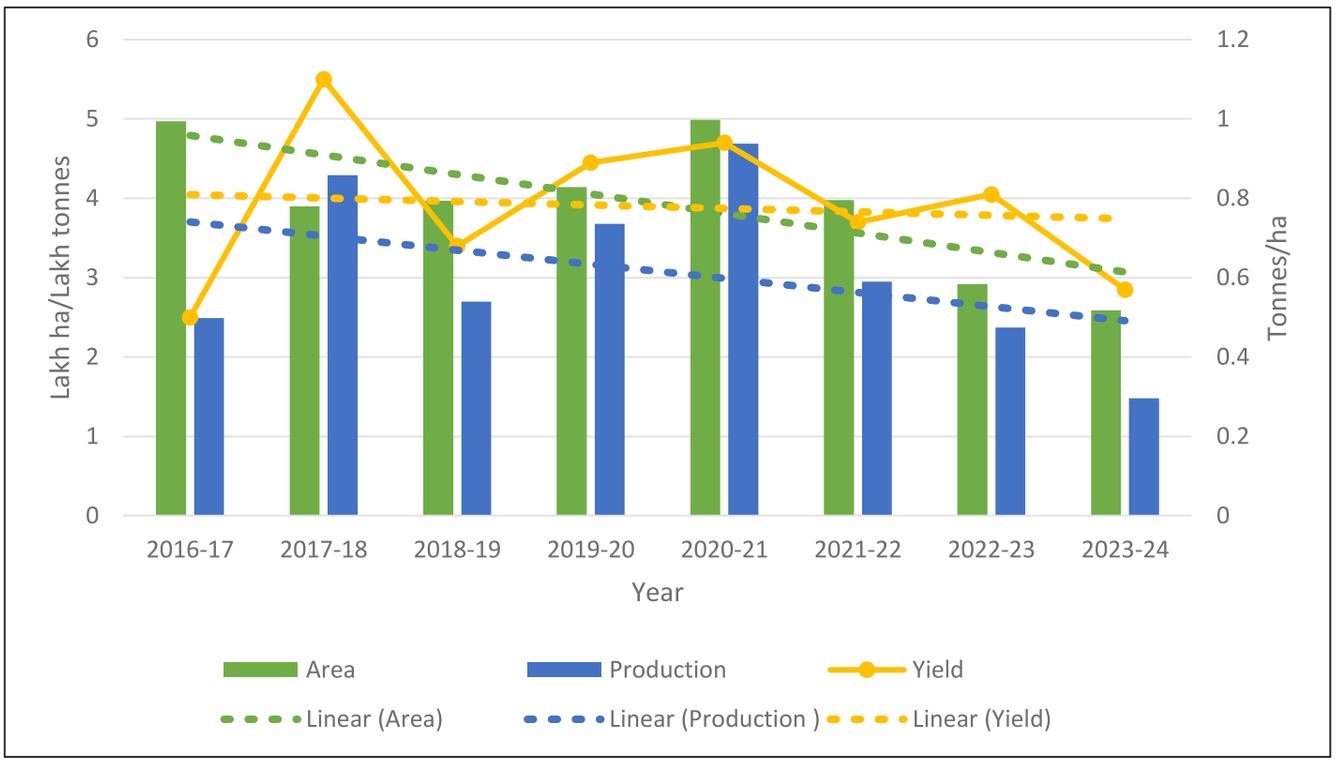


Fig. 20: Trend in *rabi*-summer groundnut in Karnataka

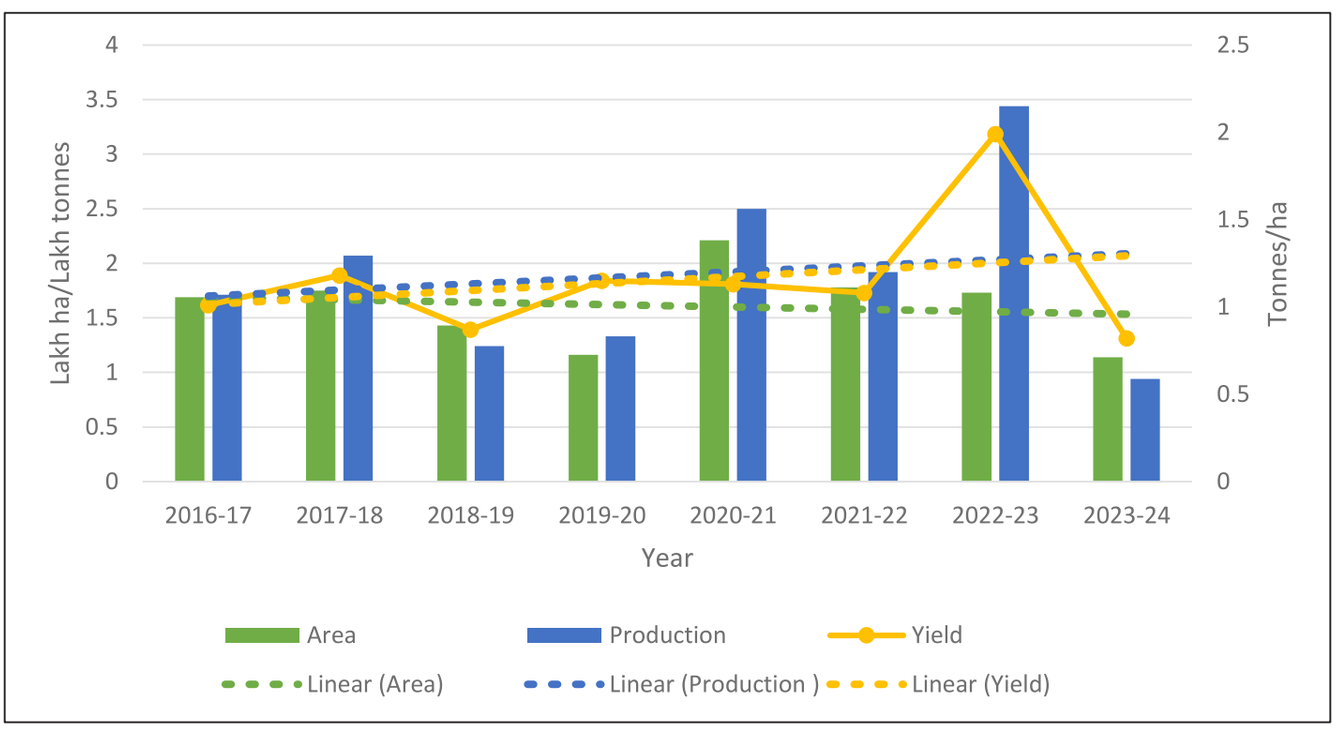


Fig. 21: Trend in *rabi*-summer groundnut in Tamil Nadu

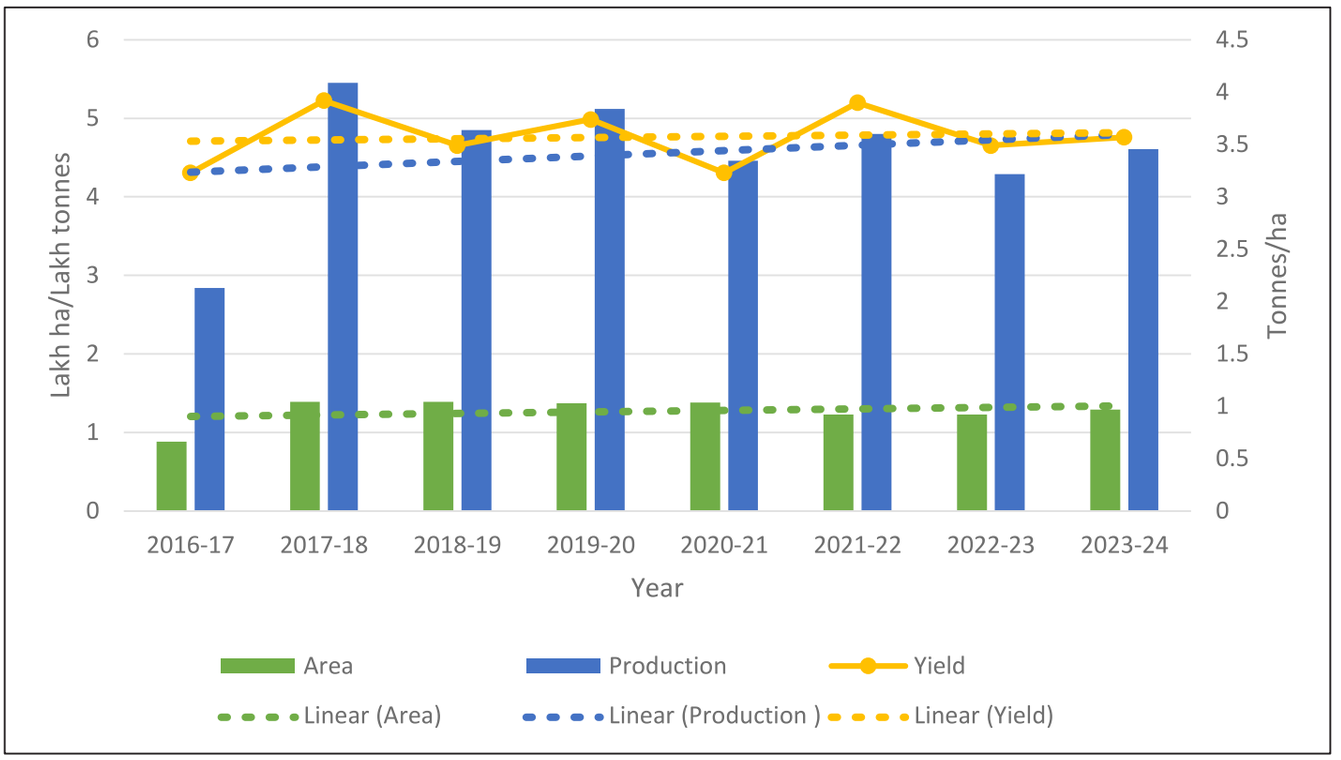


Fig. 22: Trend in *rabi*-summer groundnut in Telangana

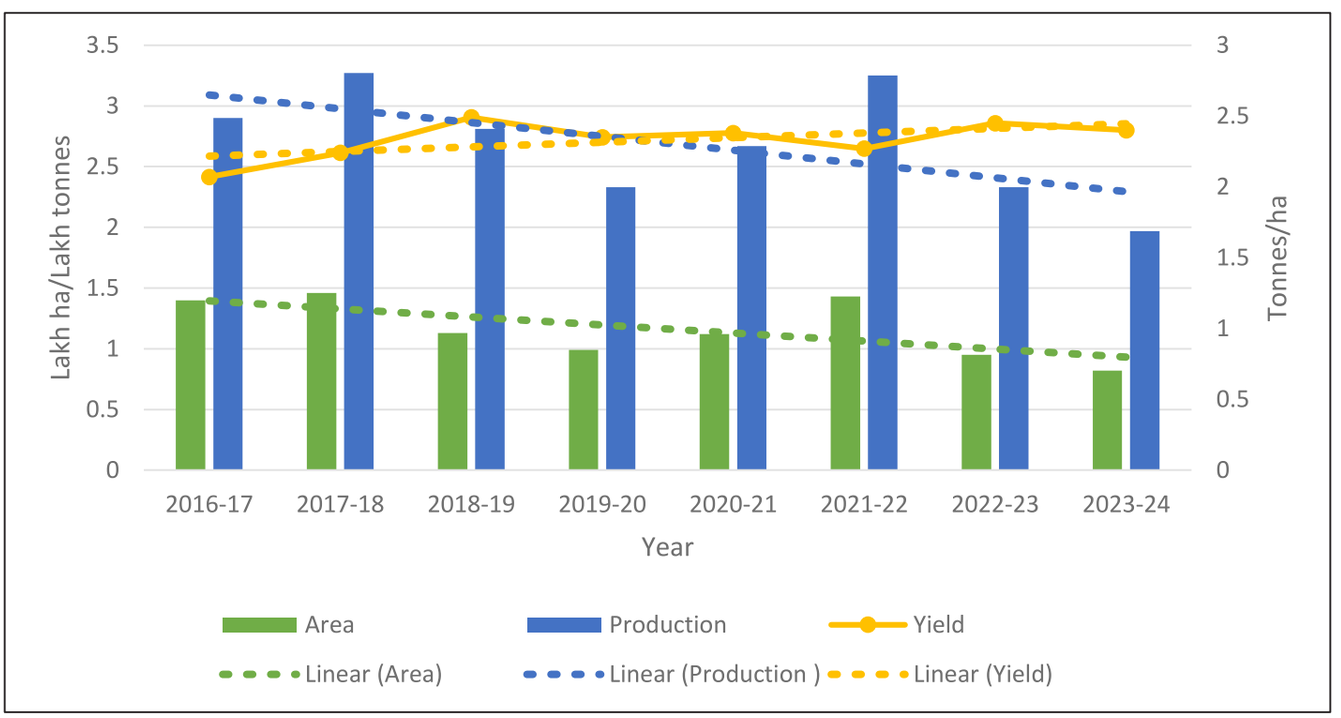


Fig. 23: Trend in *rabi*-summer groundnut in Andhra Pradesh

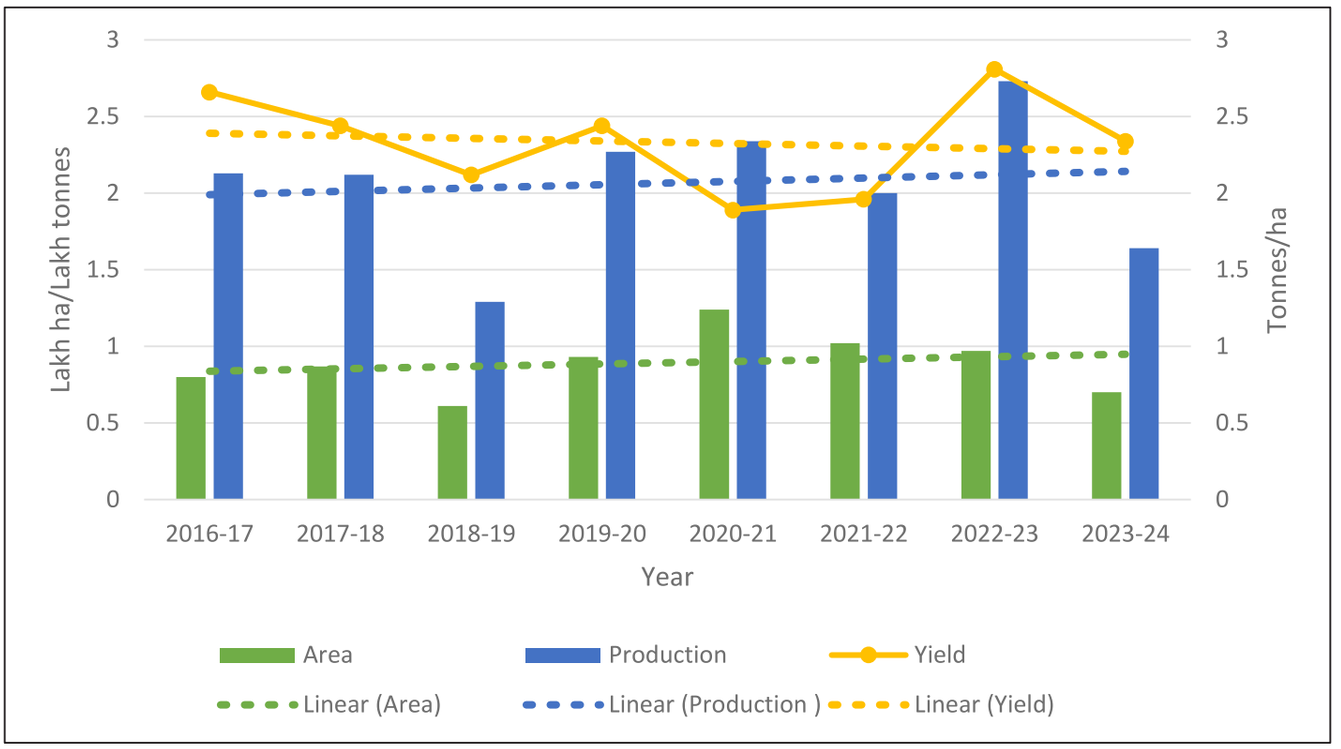
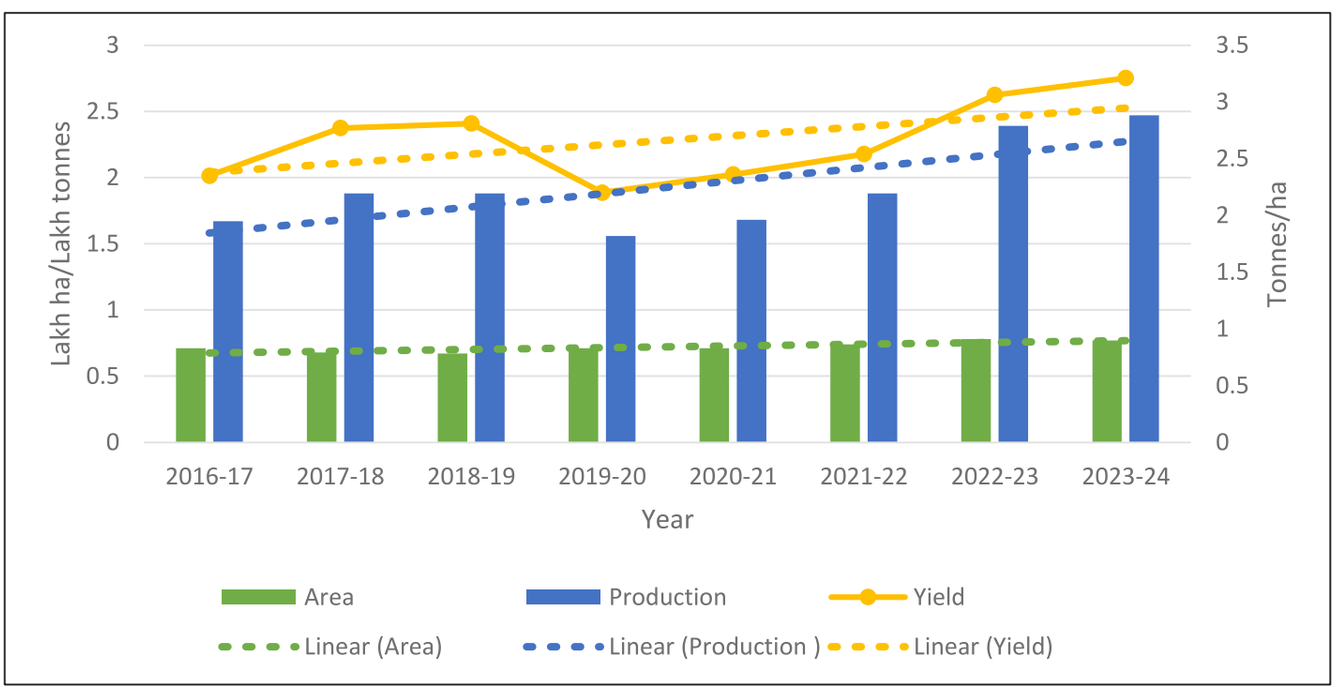
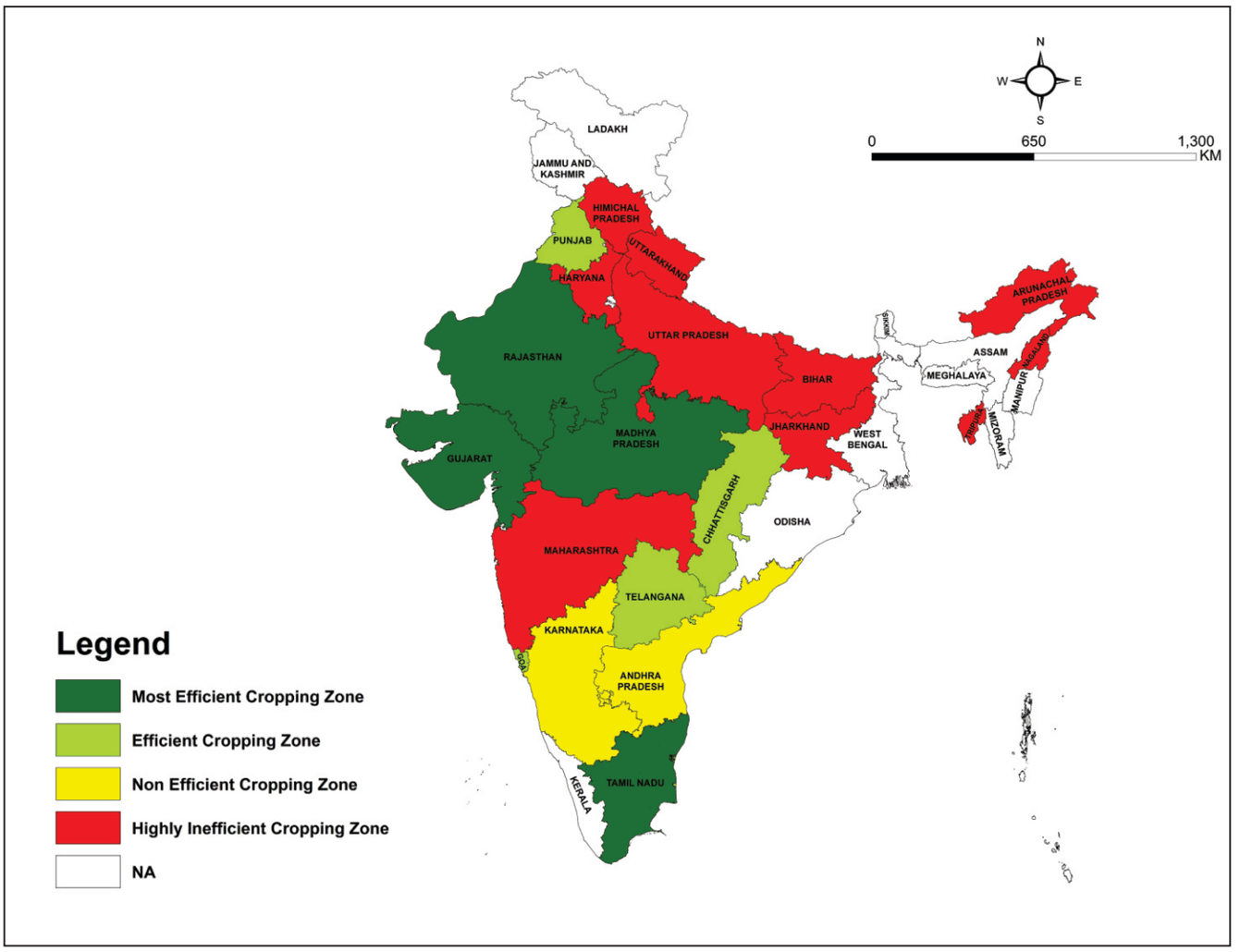


Fig. 24: Trend in *rabi*-summer groundnut in West Bengal



II. Efficient cropping zones (states) for *kharif* groundnut in India

Fig. 25: Efficient cropping zones for *kharif* groundnut in India

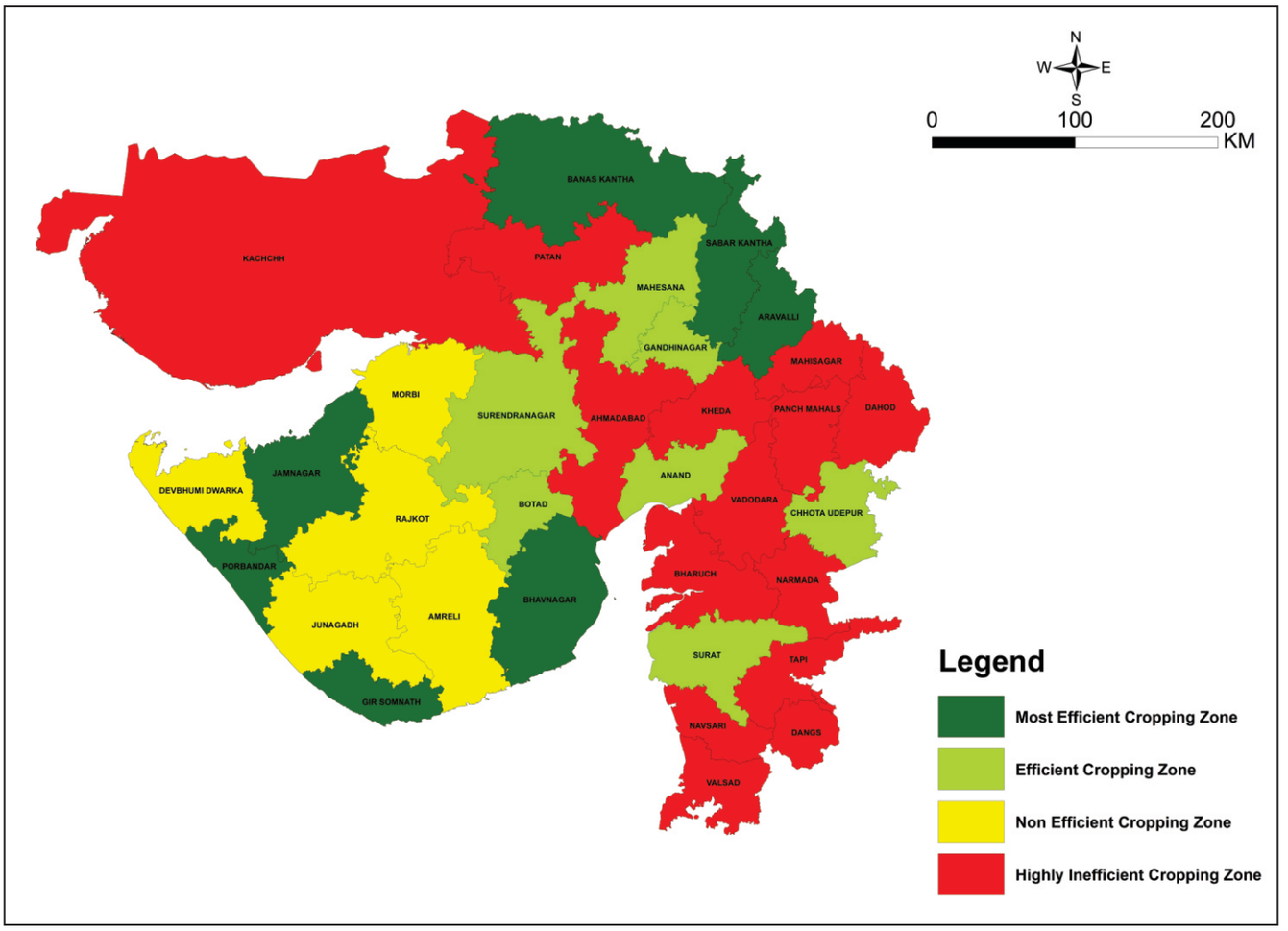


Efficiency	RSI-RYI	No. of States	Name of the state
MECZ	High-High	04	Gujarat, Madhya Pradesh, Rajasthan, Tamil Nadu
ECZ	Low-High	05	Chhattisgarh, Goa, Puducherry, Punjab, Telangana
NECZ	High-Low	02	Andhra Pradesh, Karnataka
HICZ	Low-Low	10	Arunachal Pradesh, Bihar, Haryana, Himachal Pradesh, Jharkhand, Maharashtra, Nagaland, Tripura, Uttar Pradesh, Uttarakhand

III. Efficient cropping zones (districts) for *kharif* groundnut

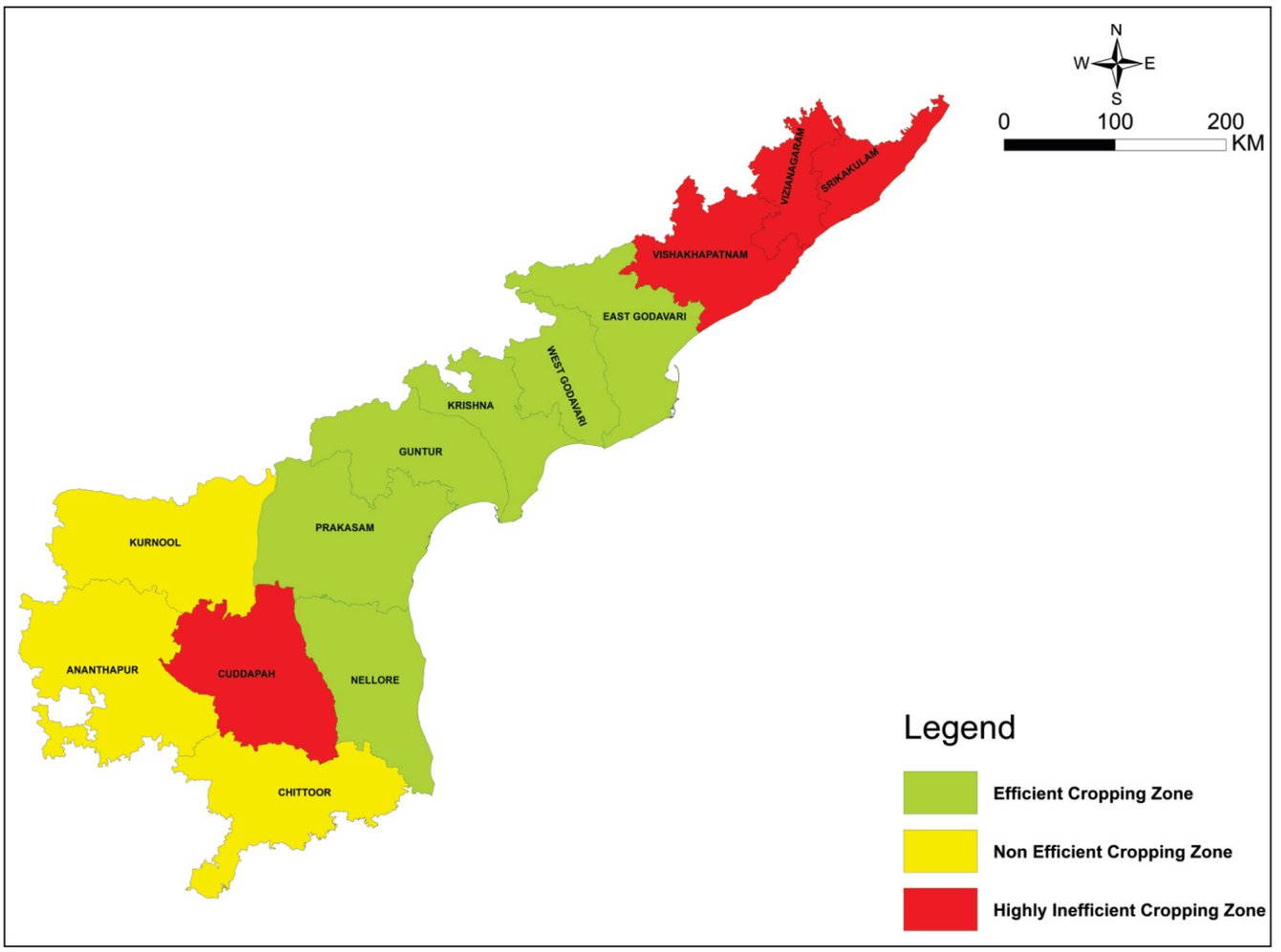
a. Traditional groundnut growing states

Fig. 26: Efficient cropping zones of *Kharif* groundnut in Gujarat



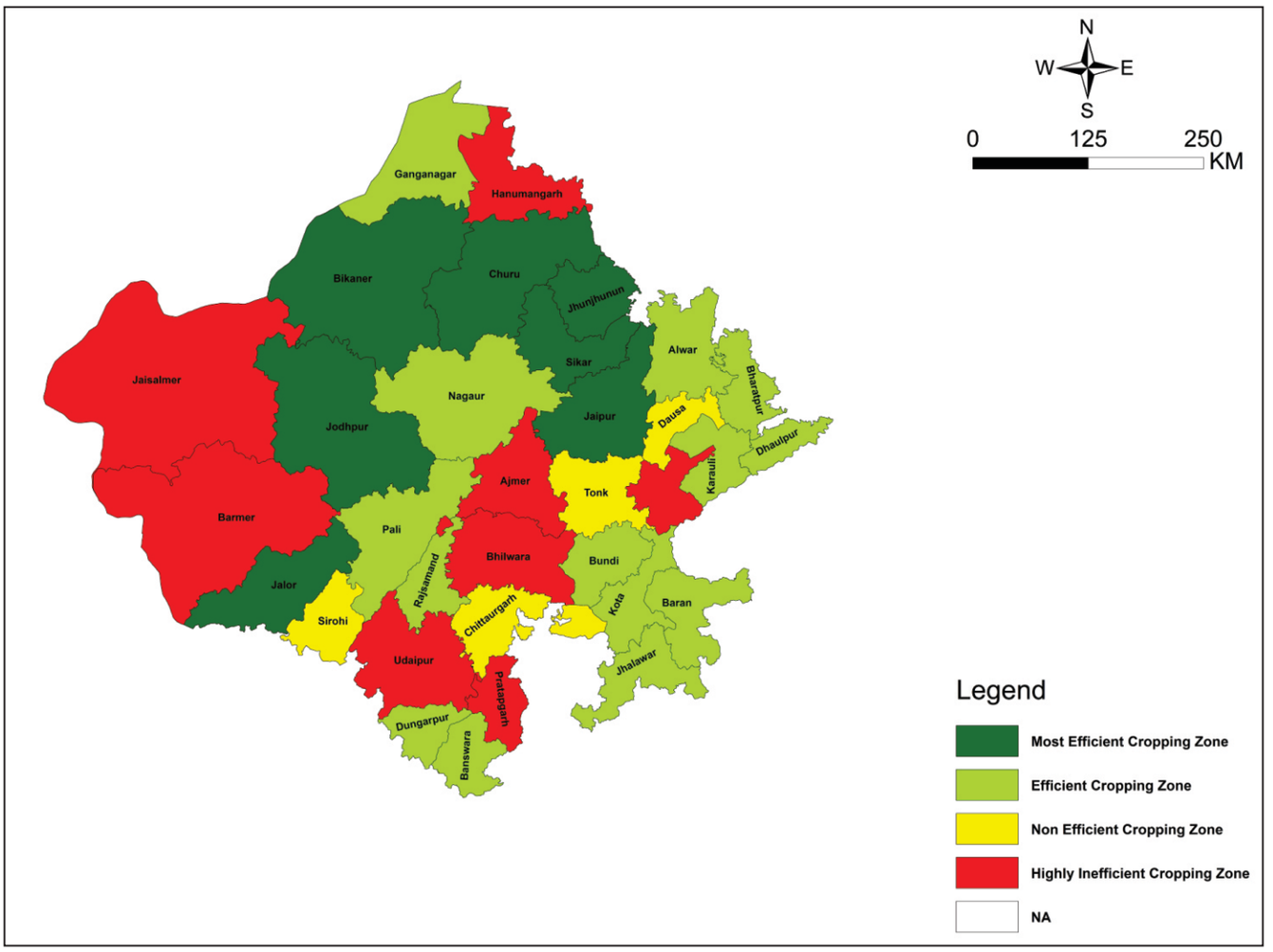
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	07	Aravalli, Banaskantha, Bhavnagar, Gir Somnath, Jamnagar, Porbandar, Sabarkantha
ECZ	Low-High	07	Anand, Botad, Chhotaudepur, Gandhinagar, Mahesana, Surat, Surendranagar
NECZ	High-Low	05	Amreli, Devbhumi Dwarka, Junagadh, Morbi, Rajkot
HIEZ	Low-Low	14	Ahmedabad, Bharuch, Dang, Dohad, Kachchh, Kheda, Mahisagar, Narmada, Navsari, Patan, Tapi, Panchmahal, Vadodara, Valsad

Fig. 27: Efficient cropping zones of *Kharif* groundnut in Andhra Pradesh



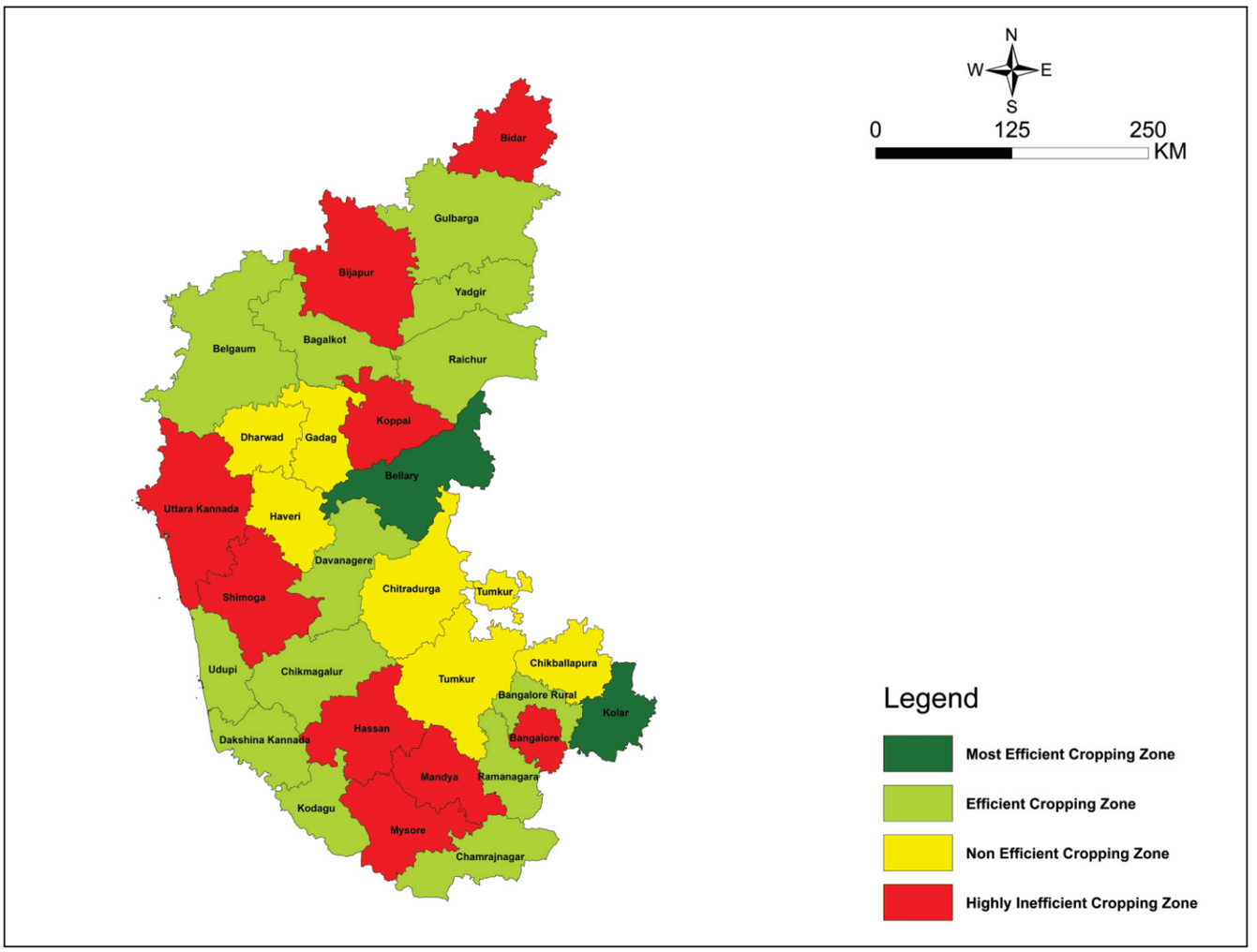
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	00	-
ECZ	Low-High	06	East Godavari, Guntur, Krishna, Prakasam, SPSR Nellore, West Godavari
NECZ	High-Low	03	Anantapur, Chittoor, Kurnool
HICZ	Low-Low	04	Kadapa, Srikakulam, Visakhapatanam, Vizianagaram

Fig. 28: Efficient cropping zones of *Kharif* groundnut in Rajasthan



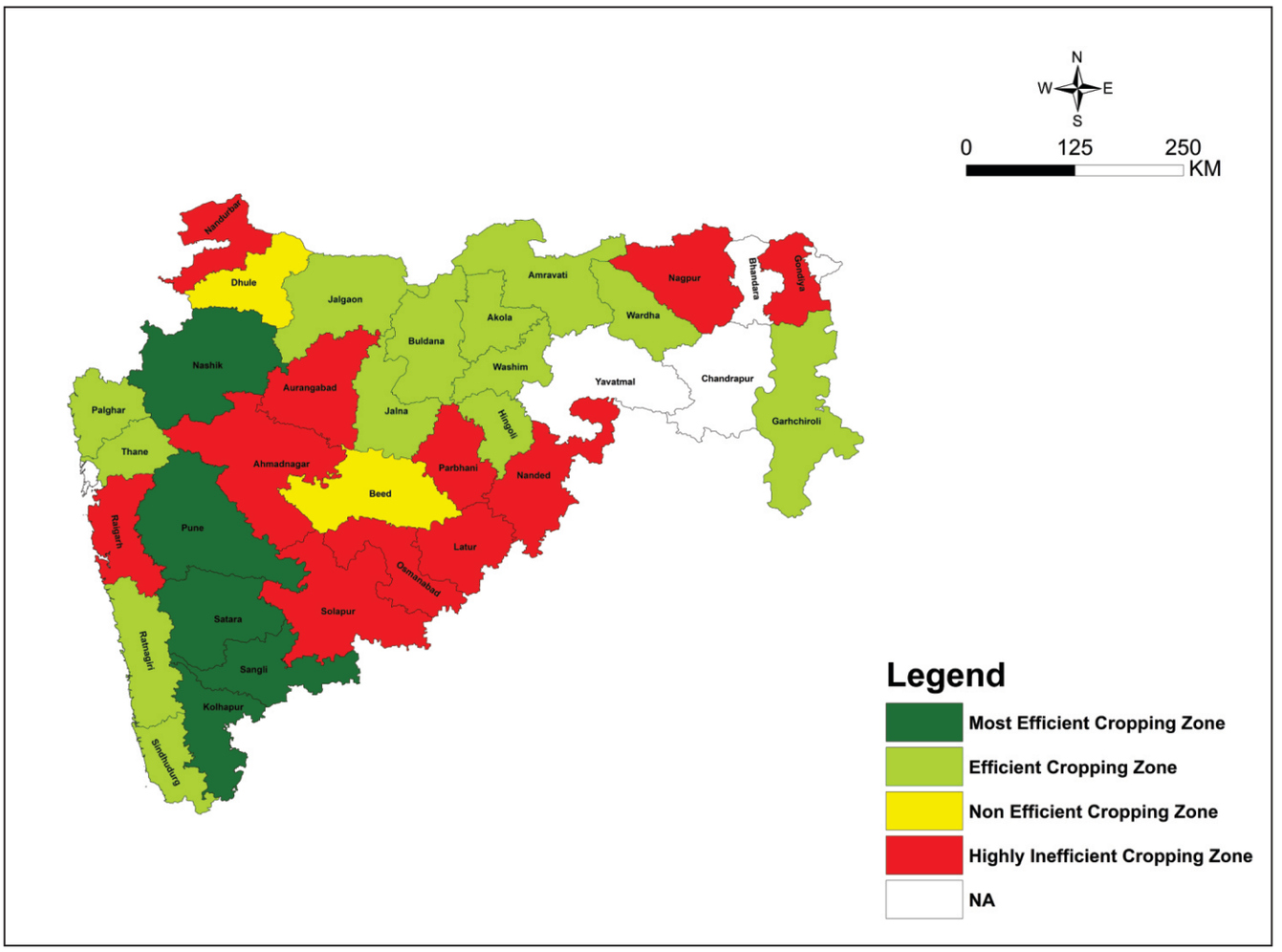
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	07	Bikaner, Churu, Jaipur, Jalore, Jhunjhunu, Jodhpur, Sikar
ECZ	Low-High	14	Alwar, Banswara, Baran, Bharatpur, Bundi, Dholpur, Dungarpur, Ganganagar, Jhalawar, Karauli, Kota, Nagaur, Pali, Rajsamand
NECZ	High-Low	04	Chittorgarh, Dausa, Sirohi, Tonk
HICZ	Low-Low	08	Ajmer, Barmer, Bhilwara, Hanumangarh, Jaisalmer, Pratapgarh, Sawai Madhopur, Udaipur

Fig. 29: Efficient cropping zones of *Kharif* groundnut in Karnataka



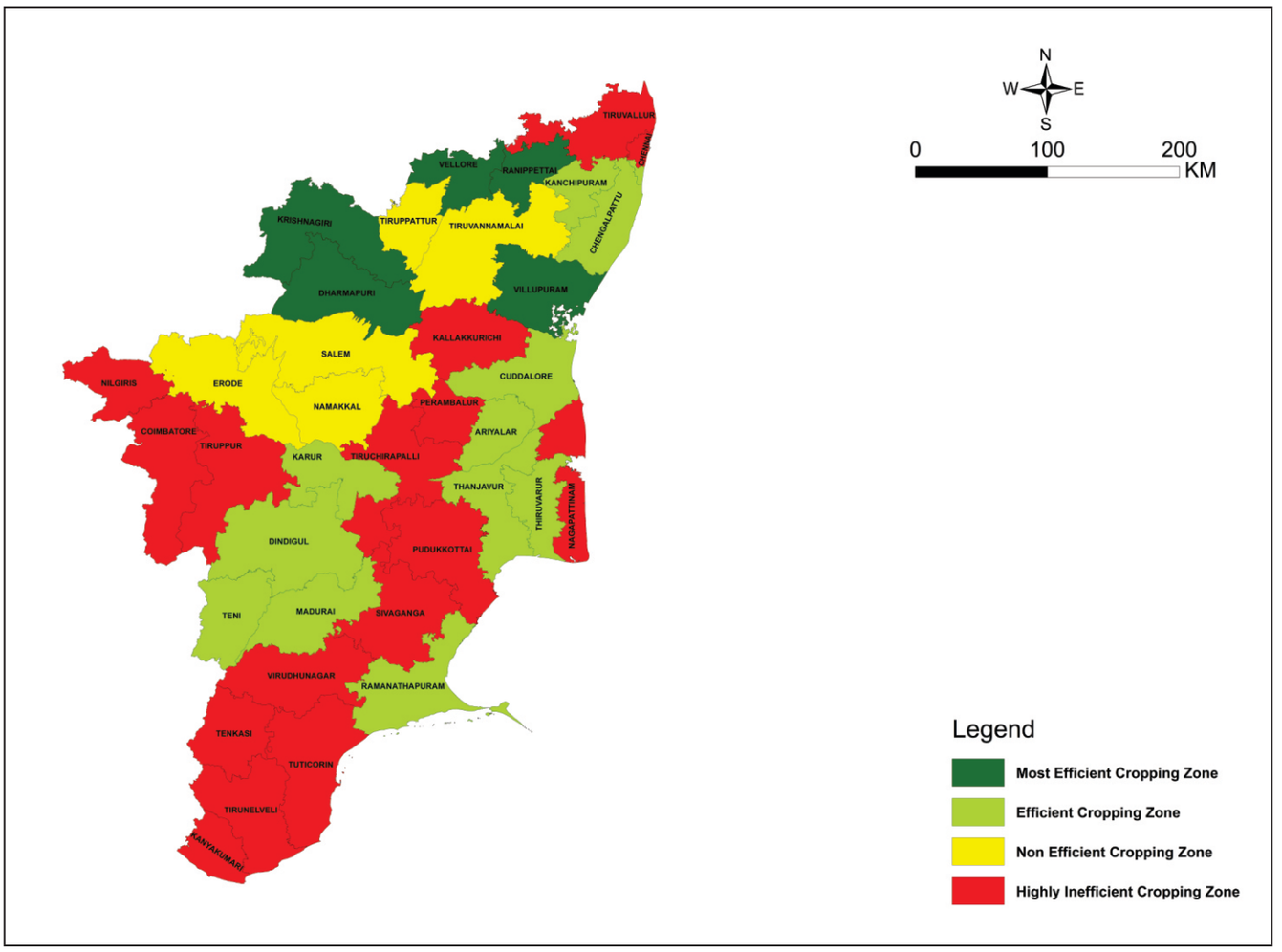
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	02	Bellary, Kolar
ECZ	Low-High	13	Bagalkot, Bangalore Rural, Belgaum, Chamarajanagar, Chikmagalur, Dakshin Kannada, Davangere, Gulbarga, Kodagu, Raichur, Ramanagara, Udupi, Yadgir
NECZ	High-Low	06	Chikballapur, Chitradurga, Dharwad, Gadag, Haveri, Tumkur
HICZ	Low-Low	09	Bengaluru Urban, Bidar, Bijapur, Hassan, Koppal, Mandya, Mysore, Shimoga, Uttar Kannada

Fig. 30: Efficient cropping zones of *Kharif* groundnut in Maharashtra



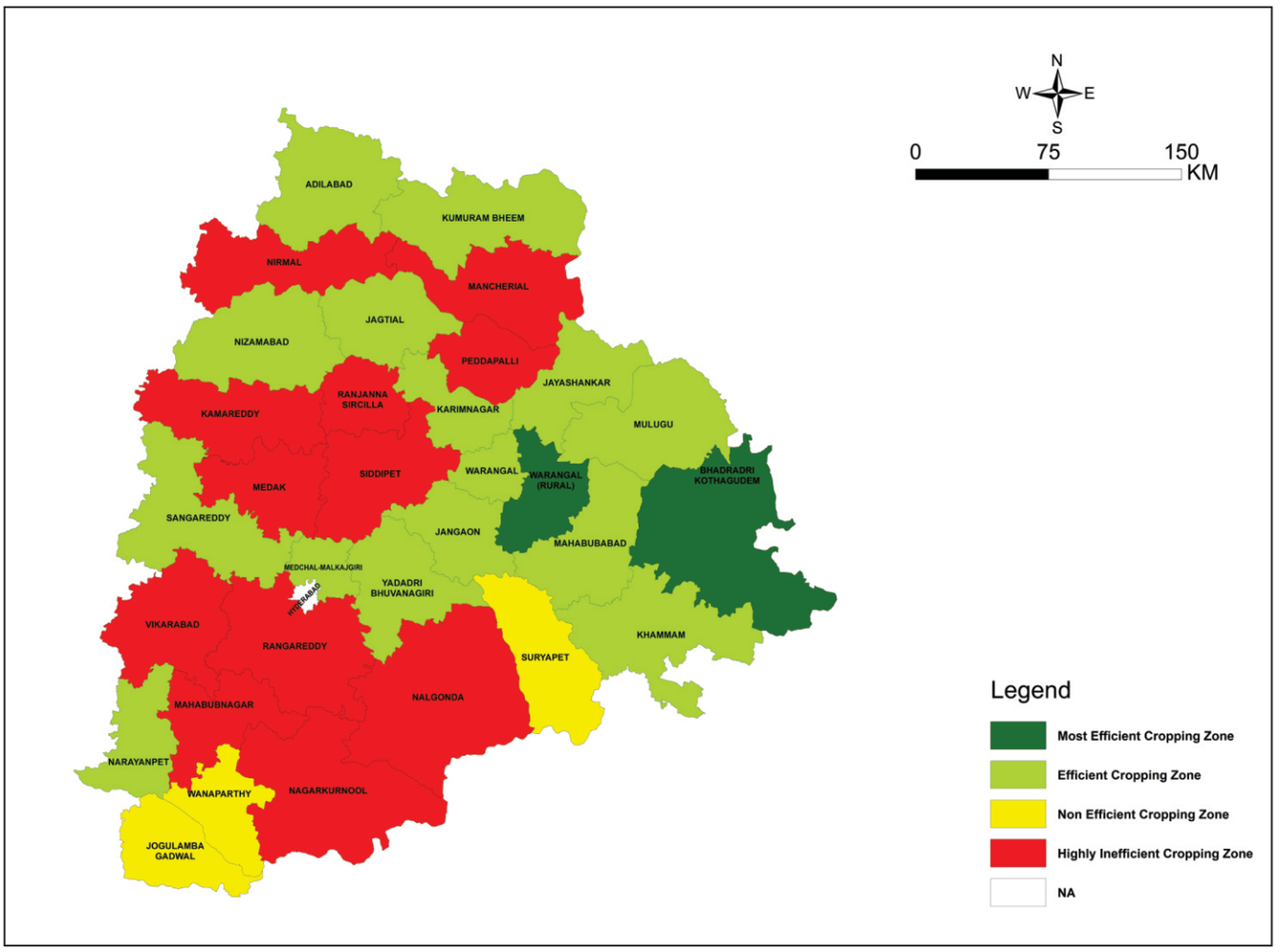
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	05	Kolhapur, Nashik, Pune, Sangli, Satara
ECZ	Low-High	13	Akola, Amravati, Buldhana, Gadchiroli, Hingoli, Jalgaon, Jalna, Palghar, Ratnagiri, Sindhudurg, Thane, Wardha, Washim
NECZ	High-Low	02	Beed, Dhule
HICZ	Low-Low	11	Ahmednagar, Aurangabad, Gondia, Latur, Nagpur, Nanded, Nandurbar, Osmanabad, Parbhani, Raigad, Solapur

Fig. 31: Efficient cropping zones of *Kharif* groundnut in Tamil Nadu



Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	5	Dharmapuri, Krishnagiri, Ranipet, Vellore, Villupuram
ECZ	Low-High	11	Ariyalur, Chengalpattu, Cuddalore, Dindigul, Kanchipuram, Karur, Madurai, Theni, Ramanathapuram, Thanjavur, Thiruvarur
NECZ	High-Low	5	Erode, Namakkal, Salem, Tirupathur, Tiruvannamalai
HICZ	Low-Low	17	Chennai, Coimbatore, Kallakurichi, Kanniyakumari, Mayiladuthurai, Nagapattinam, Perambalur, Pudukkottai, Sivaganga, The Nilgiris, Thenkasi, Thiruvallur, Thoothukudi, Tiruchirappalli, Tirunelveli, Tiruppur, Virudhunagar

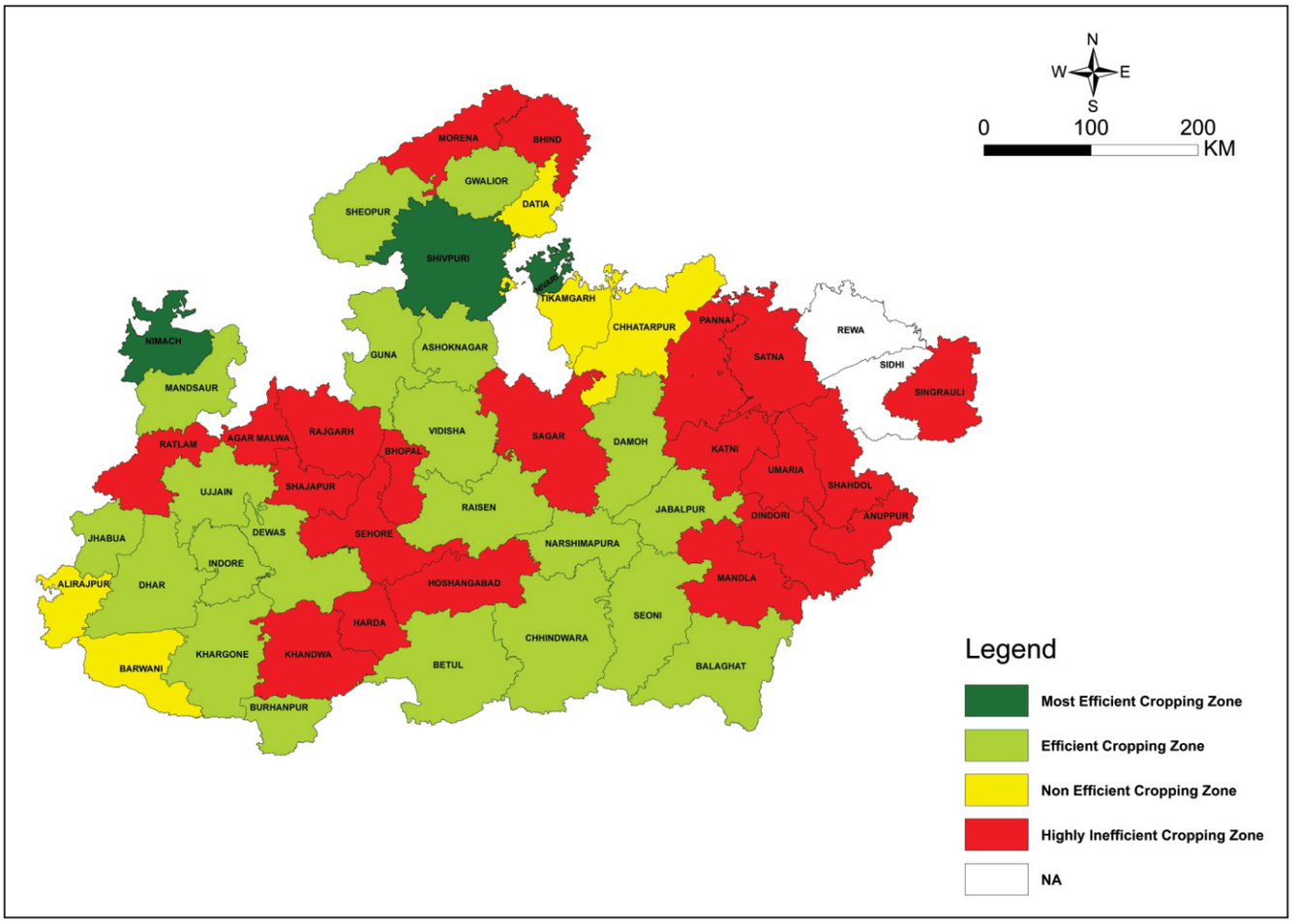
Fig. 32: Efficient cropping zones of *Kharif* groundnut in Telangana



Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	02	Bhadradri, Warangal
ECZ	Low-High	15	Adilabad, Jagitial, Jangoan, Jayashankar, Karimnagar, Khammam, Komaram Bheem Asifabad, Mahabubabad, Medchal, Mulugu, Narayanapet, Nizamabad, Sangareddy, Warangal Urban, Yadadri
NECZ	High-Low	03	Jogulamba, Suryapet, Wanaparthy
HICZ	Low-Low	12	Kamareddy, Mahbubnagar, Mancherial, Medak, Nagarkurnool, Nalgonda, Nirmal, Peddapalli, Rajanna, Rangareddi, Siddipet, Vikarabad

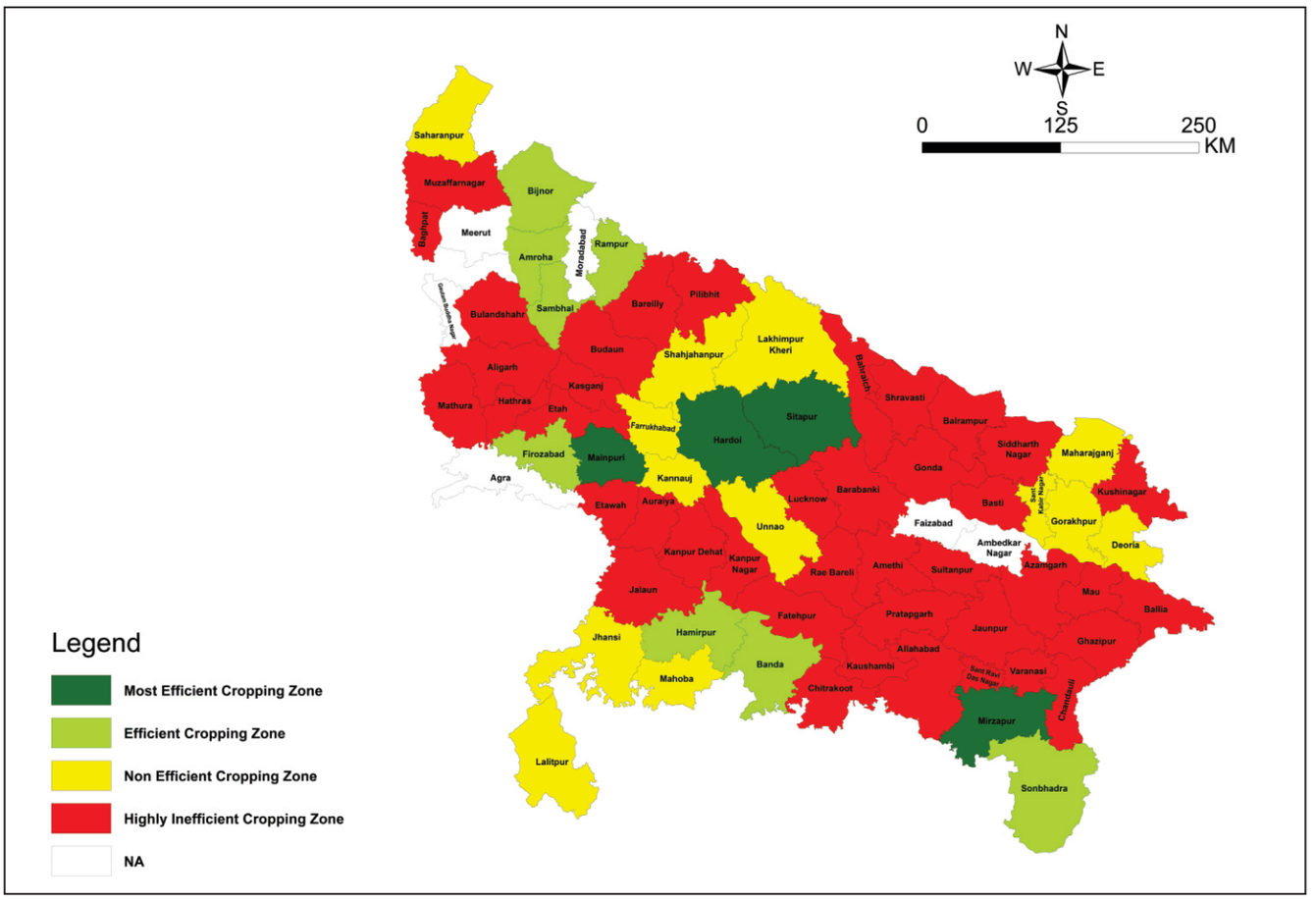
b. Non-traditional groundnut growing states

Fig. 33: Efficient cropping zones of *Kharif* groundnut in Madhya Pradesh



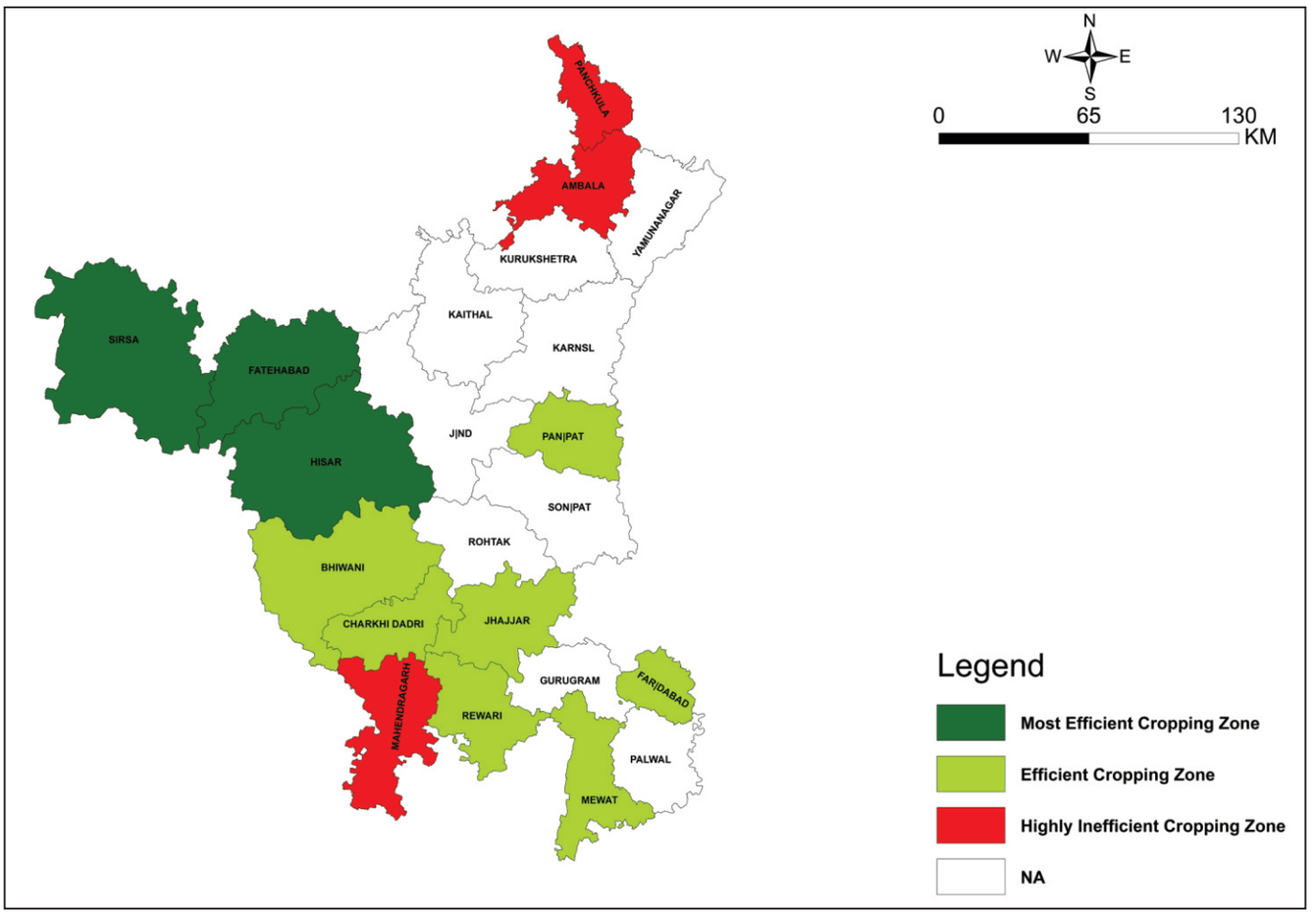
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	03	Neemuch, Niwari, Shivpuri
ECZ	Low-High	20	Ashoknagar, Balaghat, Betul, Burhanpur, Chhindwara, Damoh, Dewas, Dhar, Guna, Gwalior, Indore, Jabalpur, Jhabua, Khargone, Mandsaur, Narsinghpur, Raisen, Seoni, Sheopur, Vidisha
NECZ	High-Low	05	Alirajpur, Barwani, Chhatarpur, Datia, Tikamgarh
HICZ	Low-Low	21	Agar malwa, Anuppur, Bhind, Bhopal, Dindori, Harda, Hoshangabad, Katni, Khandwa, Mandla, Morena, Panna, Rajgarh, Ratlam, Sagar, Satna, Sehore, Shahdol, Shajapur, Singrauli, Umaria

Fig. 34: Efficient cropping zones of *Kharif* groundnut in Uttar Pradesh



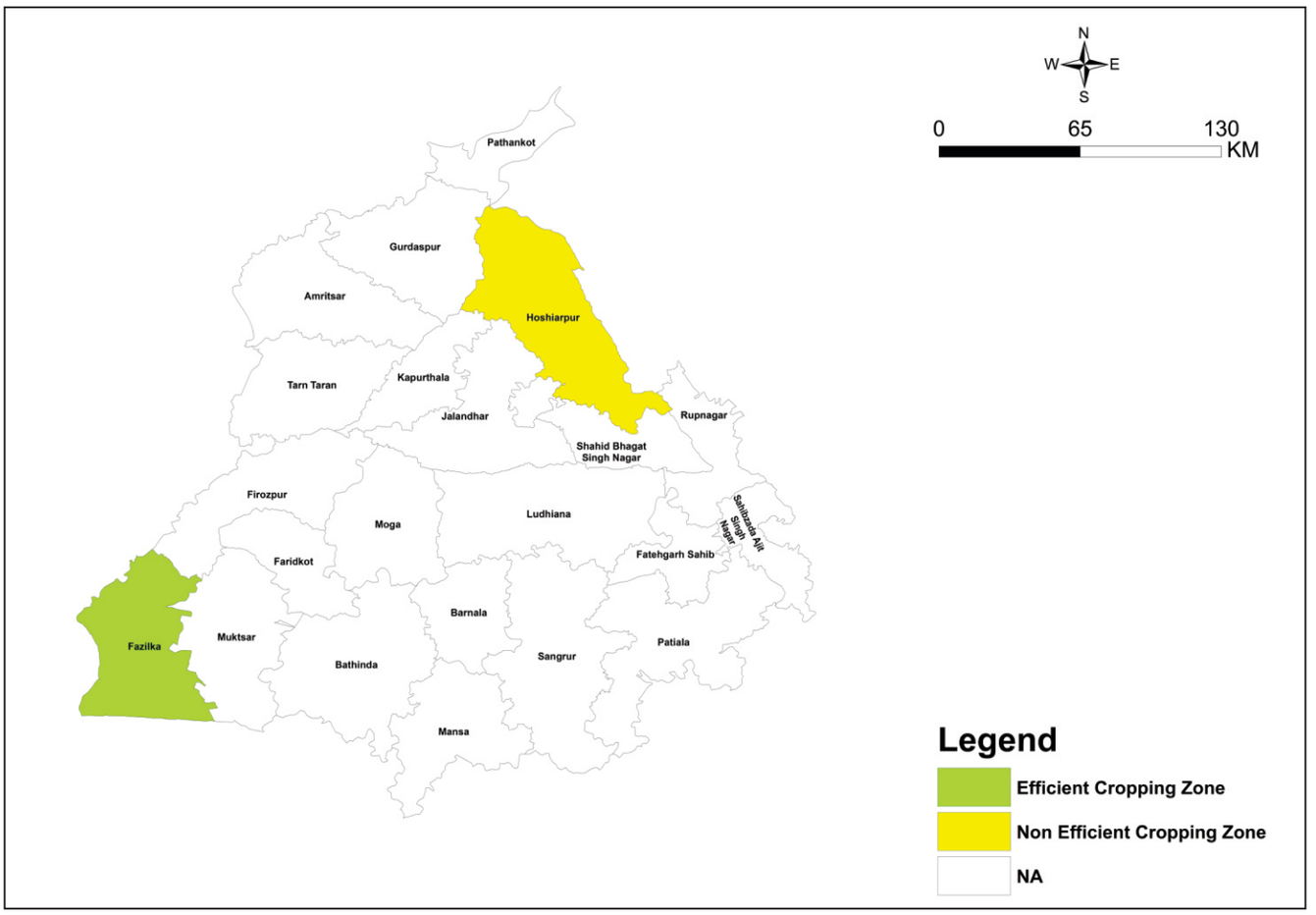
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	04	Hardoi, Mainpuri, Mirzapur, Sitapur
ECZ	Low-High	08	Amroha, Banda, Bijnor, Firozabad, Hamirpur, Rampur, Sambhal, Sonbhadra
NECZ	High-Low	13	Deoria, Farrukhabad, Gorakhpur, Jhansi, Kannauj, Kheri, Lalitpur, Maharajganj, Mahoba, Saharanpur, Sant Kabeer Nagar, Shahjahanpur, Unnao
HICZ	Low-Low	40	Aligarh, Allahabad, Amethi, Auraiya, Azamgarh, Baghpat, Bahraich, Ballia, Balrampur, Barabanki, Bareilly, Basti, Budaun, Bulandshahr, Chandauli, Chitrakoot, Etah, Etawah, Fatehpur, Ghazipur, Gonda, Hathras, Jalaun, Jaunpur, Kanpur Dehat, Kanpur Nagar, Kasganj, Kaushambi, Kushi Nagar, Lucknow, Mathura, Muzaffarnagar, Pilibhit, Pratapgarh, Rae Bareli, Sant Ravidas Nagar, Shravasti, Siddharth Nagar, Sultanpur, Varanasi

Fig. 35: Efficient cropping zones of *Kharif* groundnut in Haryana



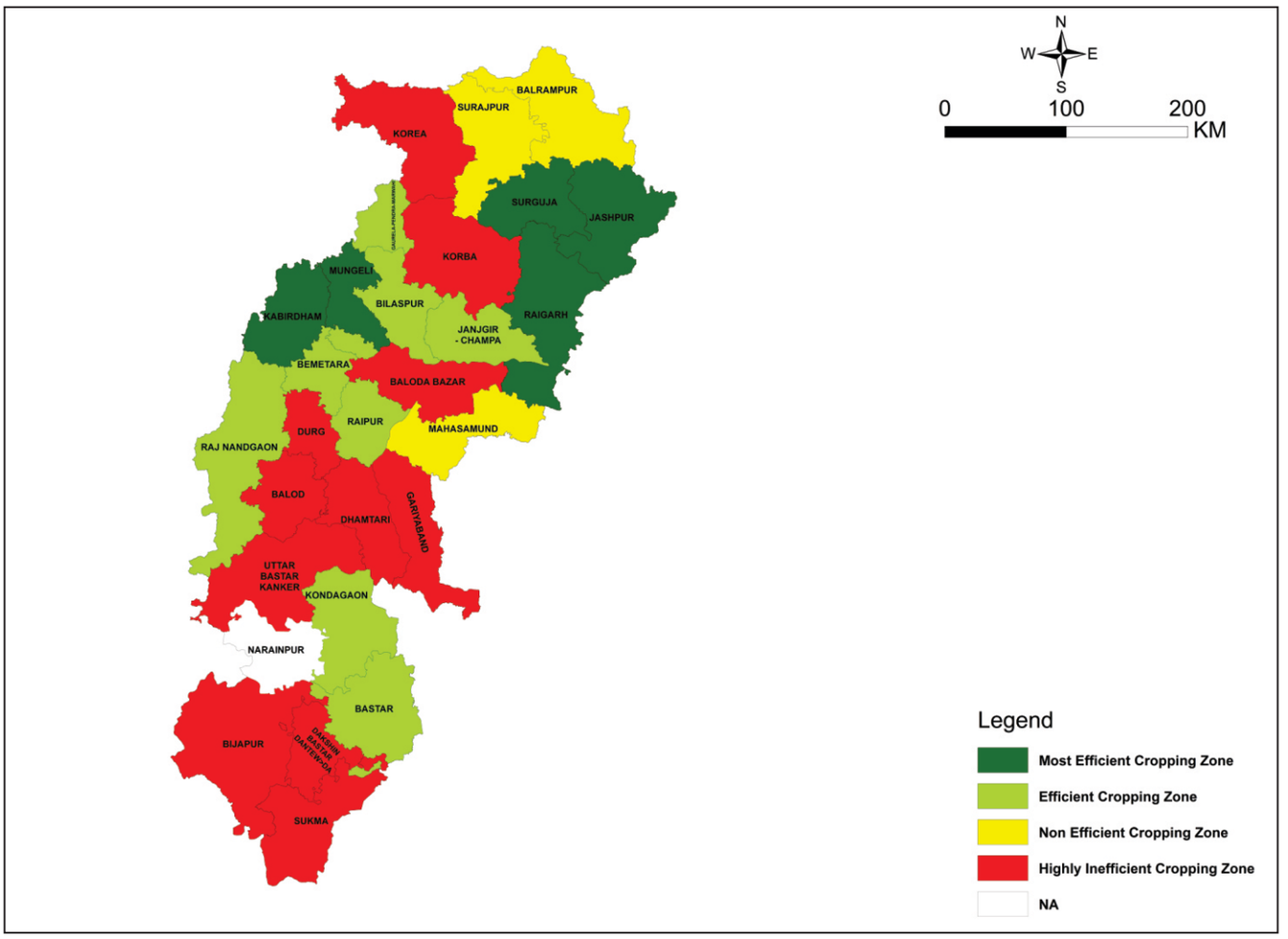
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	03	Fatehabad, Hisar, Sirsa
ECZ	Low-High	07	Bhiwani, Charki dadri, Faridabad, Jhajjar, Mewat, Panipat, Rewari
NECZ	High-Low	00	-
HICZ	Low-Low	03	Ambala, Mahendragarh, Panchkula

Fig. 36: Efficient cropping zones of *Kharif* groundnut in Punjab



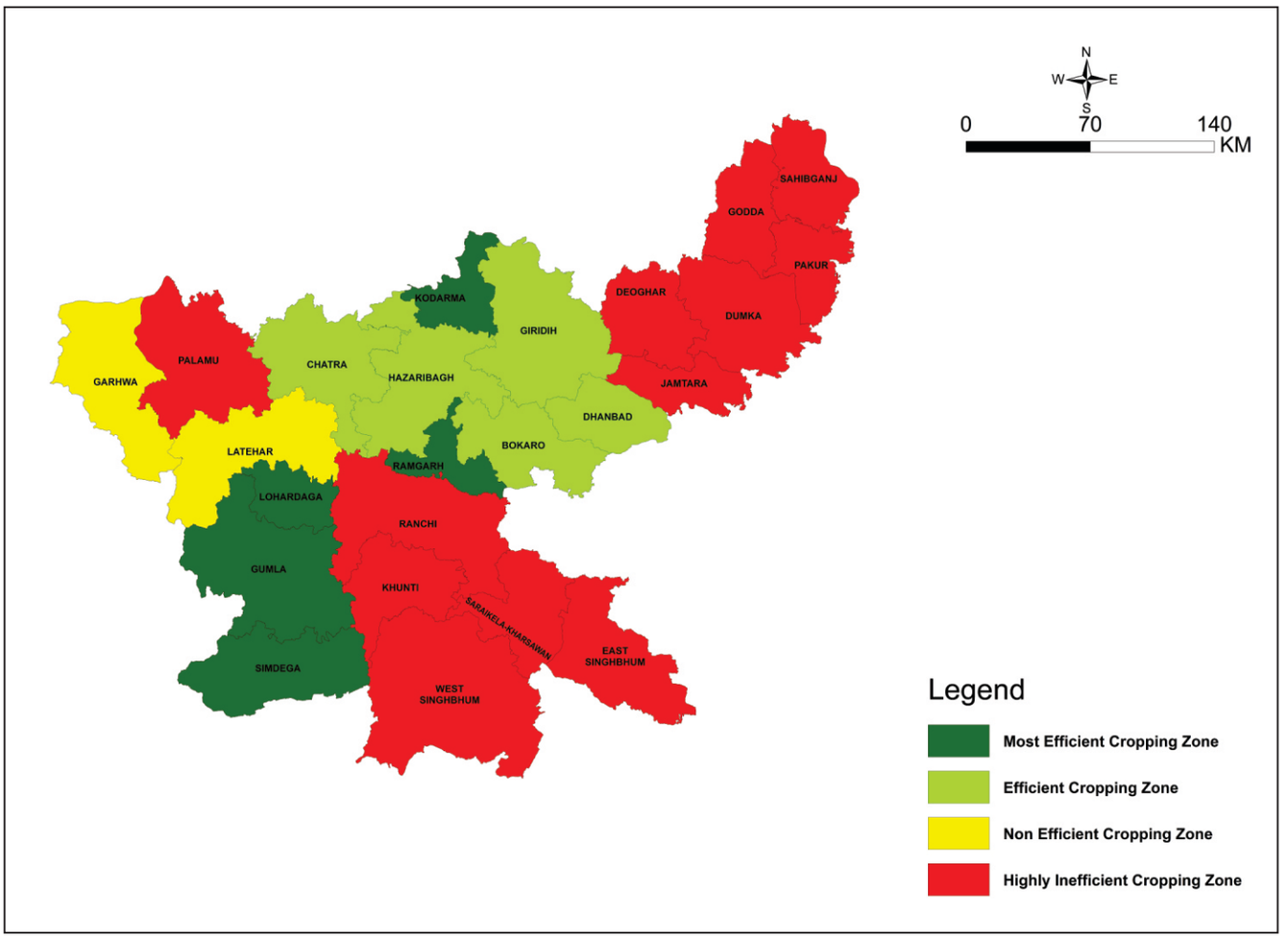
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	00	-
ECZ	Low-High	01	Fazilka
NECZ	High-Low	01	Hoshiarpur
HICZ	Low-Low`	00	-

Fig. 37: Efficient cropping zones of *Kharif* groundnut in Chhattisgarh



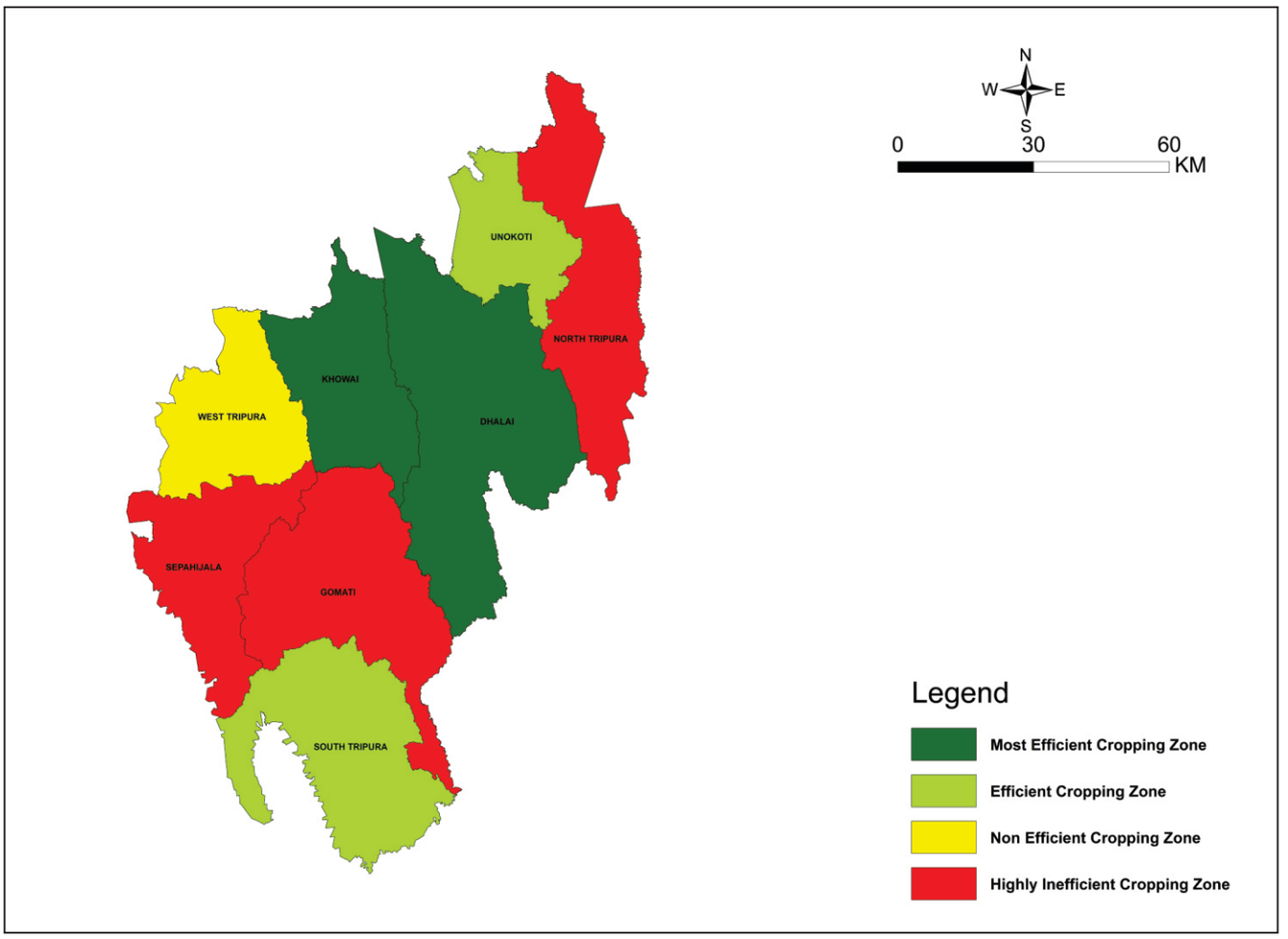
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	05	Jashpur, Kabirdham, Mungeli, Raigarh, Surguja
ECZ	Low-High	08	Bastar, Bemetara, Bilaspur, Gaurella-Pendra-Marwahi, Janjgir-Champa, Kondagaon, Raipur, Rajnandgaon
NECZ	High-Low	03	Balrampur, Mahasamund, Surajpur
HICZ	Low-Low	11	Balod, Baloda Bazar, Bijapur, Dantewada, Dhamtari, Durg, Gariyaband, Kanker, Korba, Korea, Sukma

Fig. 38: Efficient cropping zones of *Kharif* groundnut in Jharkhand



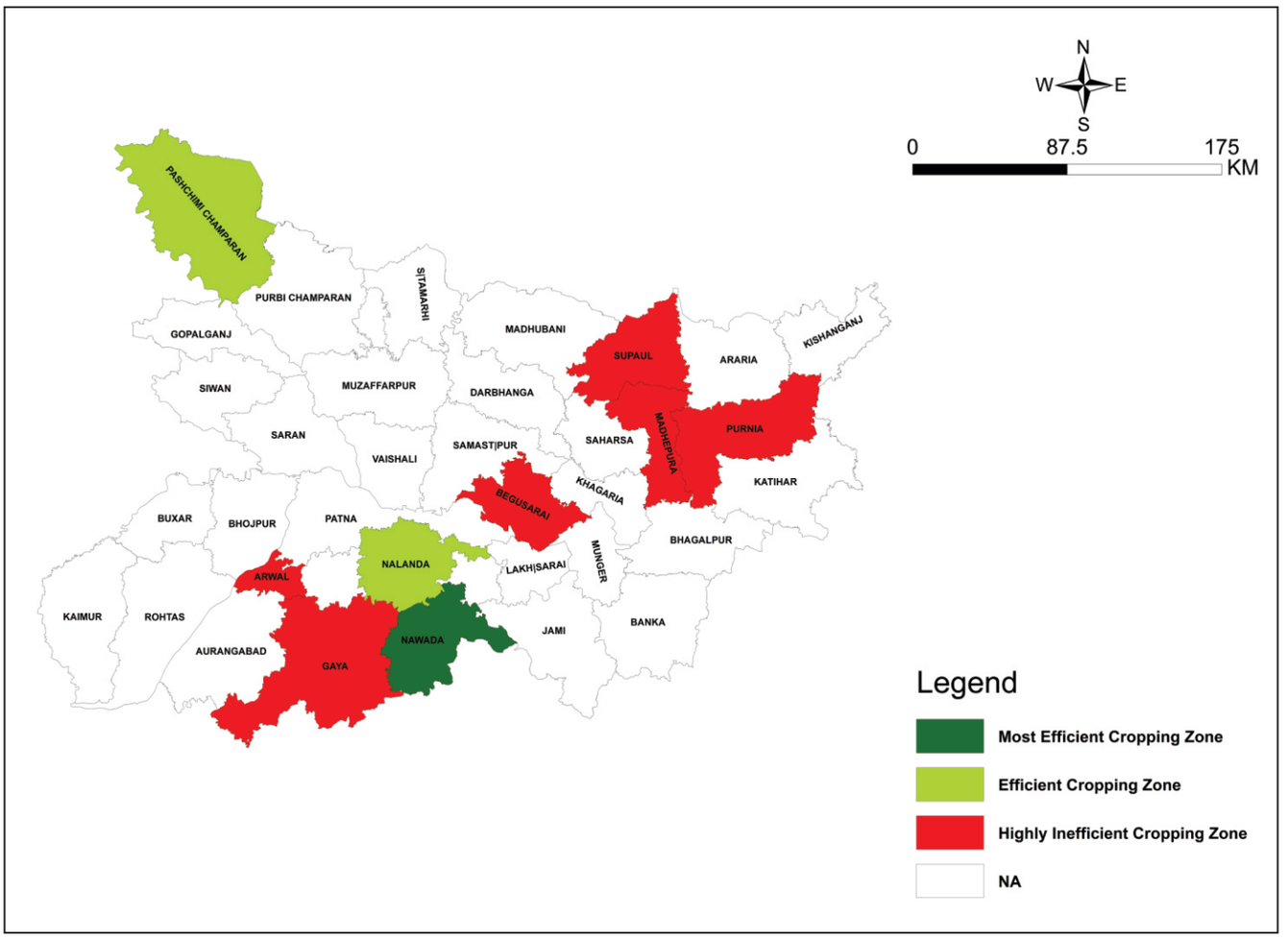
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	05	Gumla, Koderma, Lohardaga, Ramgarh, Simdega
ECZ	Low-High	05	Bokaro, Chatra, Dhanbad, Giridih, Hazaribagh
NECZ	High-Low	02	Garhwa, Latehar
HICZ	Low-Low	12	Deoghar, Dumka, East Singhbum, Godda, Jamtara, Khunti, Pakur, Palamu, Ranchi, Sahebganj, Saraikela Kharsawan, West Singhbhum

Fig. 39: Efficient cropping zones of *Kharif* groundnut in Tripura



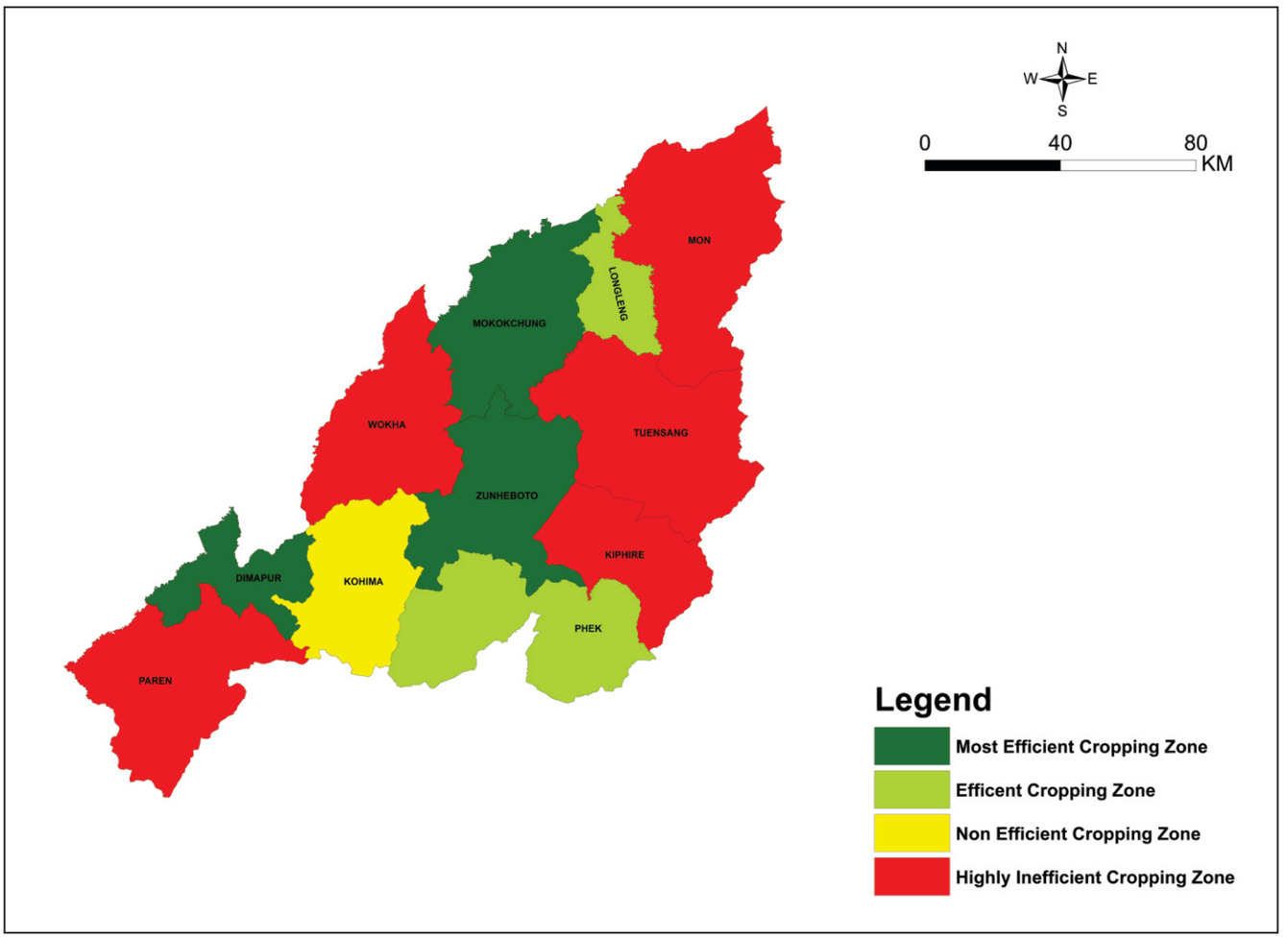
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	02	Dhalai, Khowai
ECZ	Low-High	02	South Tripura, Unakoti
NECZ	High-Low	01	West Tripura
HICZ	Low-Low	03	Gomati, North Tripura, Sepahijala

Fig. 40: Efficient cropping zones of *Kharif* groundnut in Bihar



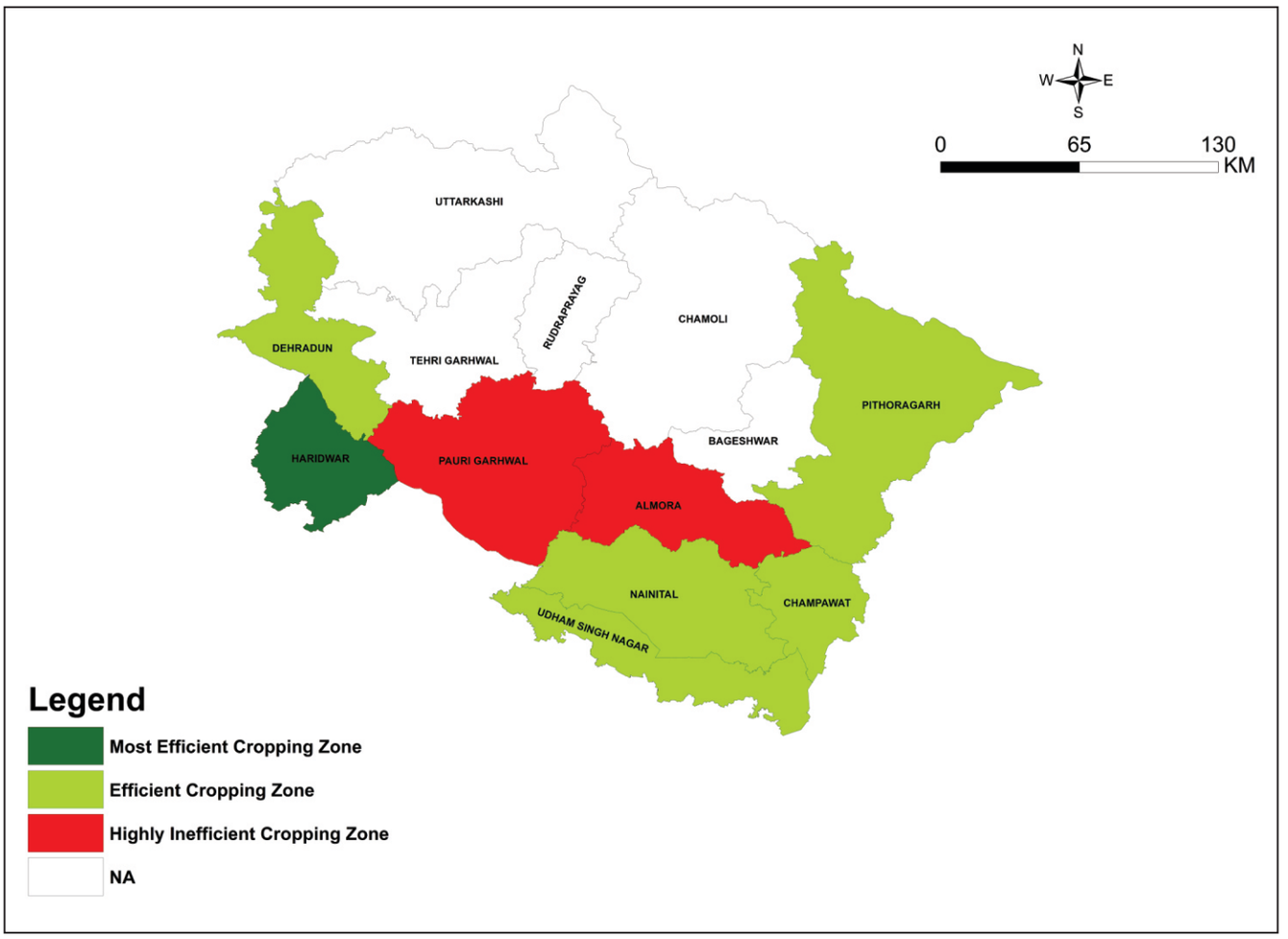
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	01	Nawada
ECZ	Low-High	02	Nalanda, Pashchim Champaran
NECZ	High-Low	00	-
HICZ	Low-Low	06	Arwal, Begusarai, Gaya, Madhepura, Purnia, Supaul

Fig. 41: Efficient cropping zones of *Kharif* groundnut in Nagaland



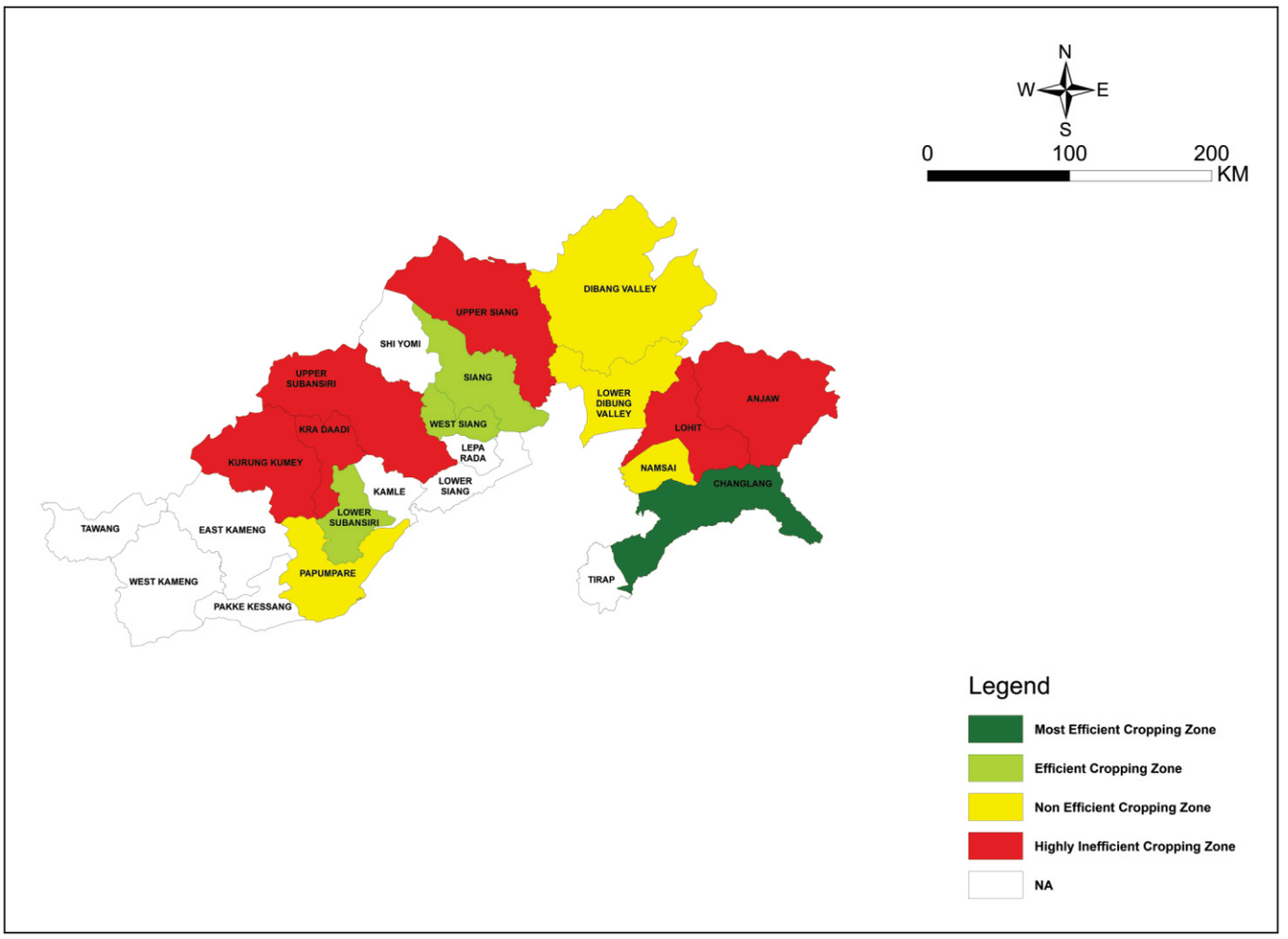
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	03	Dimapur, Mokokchung, Zunheboto
ECZ	Low-High	02	Longleng, Phek
NECZ	High-Low	01	Kohima
HICZ	Low-Low	05	Kiphire, Mon, Peren, Tuensang, Wokha

Fig. 42: Efficient cropping zones of *Kharif* groundnut in Uttarakhand



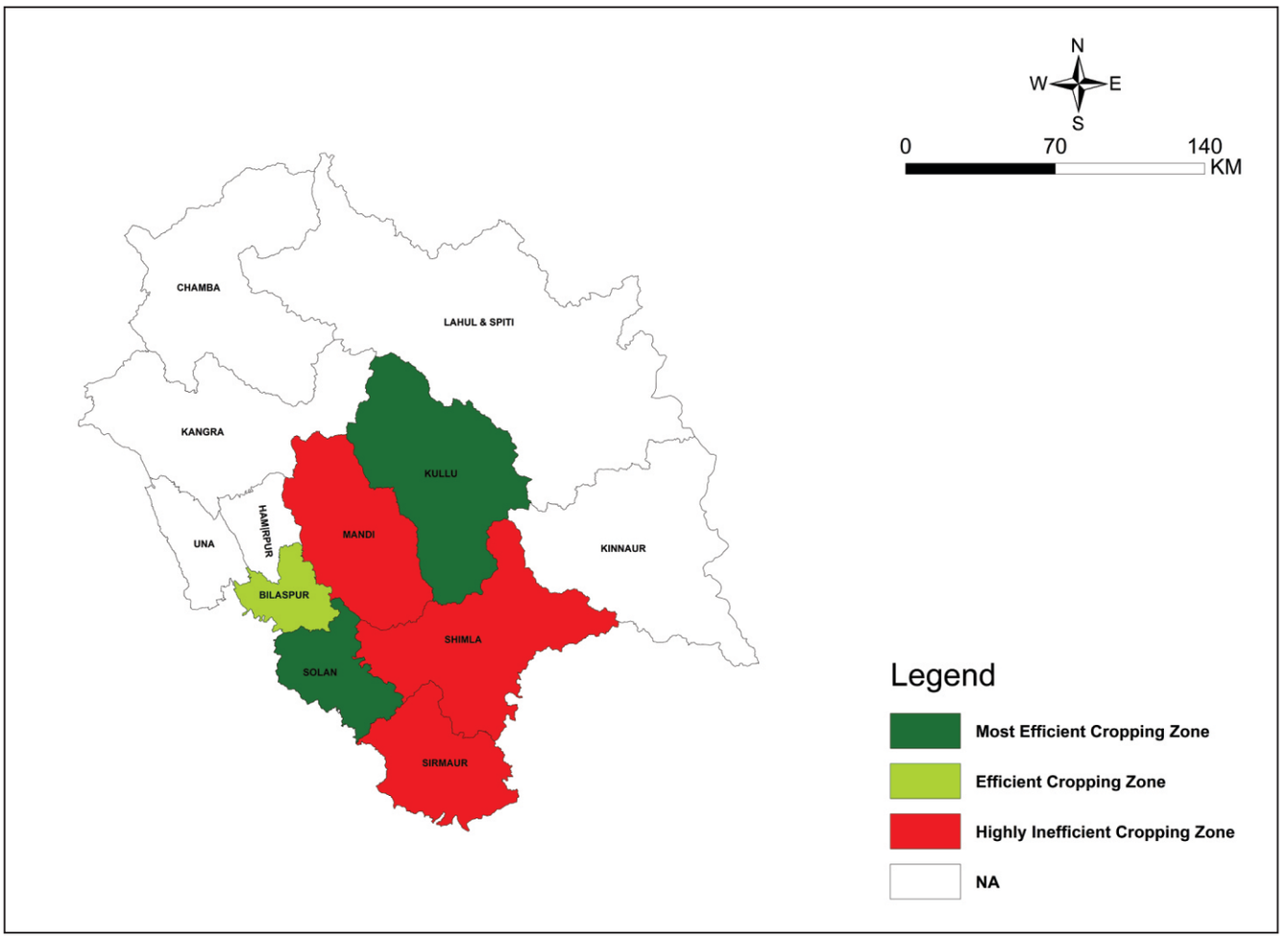
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	01	Haridwar
ECZ	Low-High	05	Champawat, Dehradun, Nainital, Pithoragarh, Udam Singh Nagar
NECZ	High-Low	00	-
HICZ	Low-Low	02	Almora, Pauri garhwal

Fig. 43: Efficient cropping zones of *Kharif* groundnut in Arunachal Pradesh



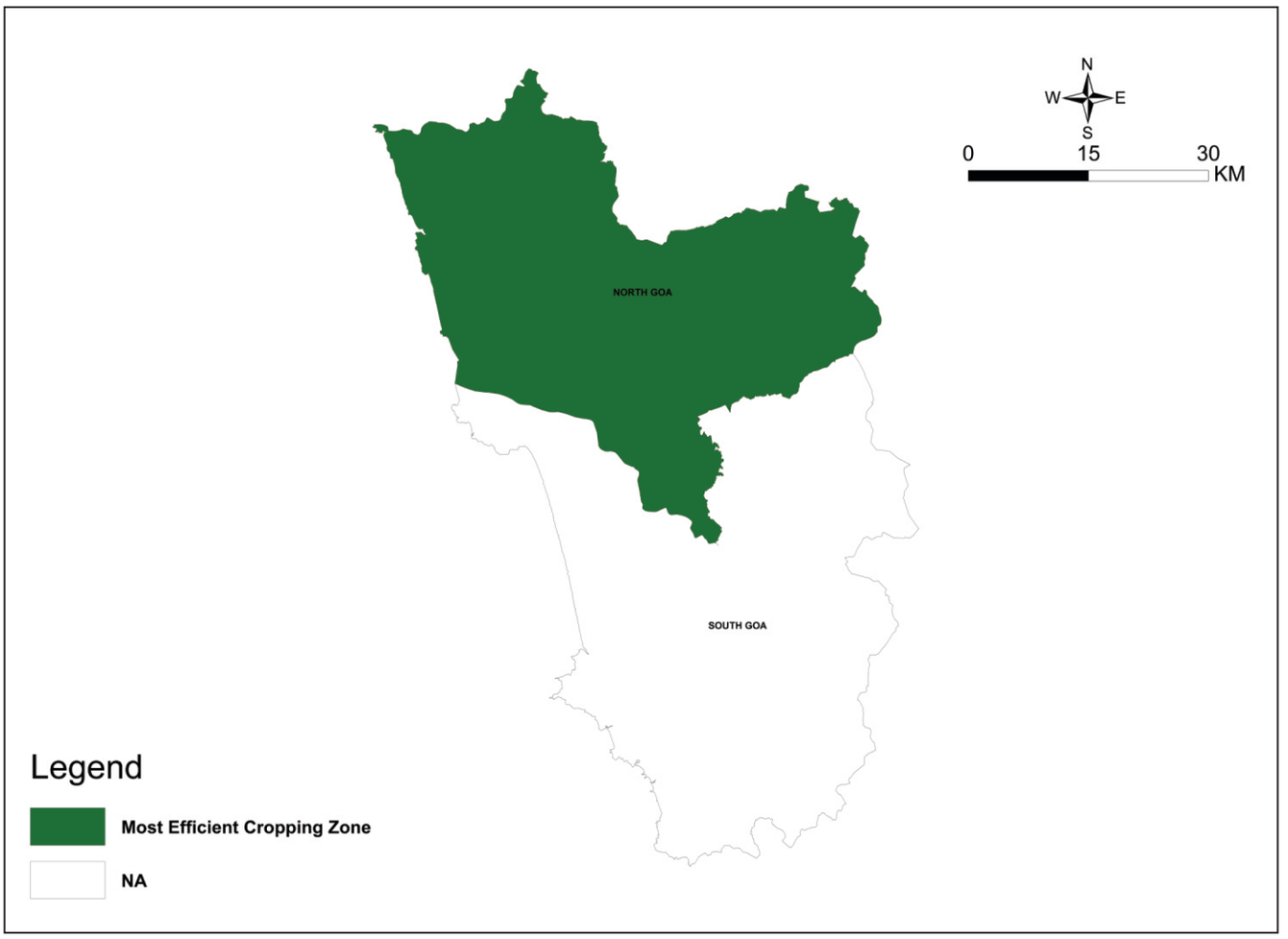
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	01	Changlang
ECZ	Low-High	03	Lower Subansiri, Siang, West Siang
NECZ	High-Low	04	Dibang Valley, Lower Dibang Valley, Namsai, Papum Pare
HICZ	Low-Low	06	Anjaw, East Siang, Kra Daadi, Kurung Kumey, Lohit, Upper Subansiri

Fig. 44: Efficient cropping zones of *Kharif* groundnut in Himachal Pradesh



Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	02	Kullu, Solan
ECZ	Low-High	01	Bilaspur
NECZ	High-Low	00	-
HICZ	Low-Low	03	Mandi, Shimla, Sirmaur

Fig. 45: Efficient cropping zones of *Kharif* groundnut in Goa



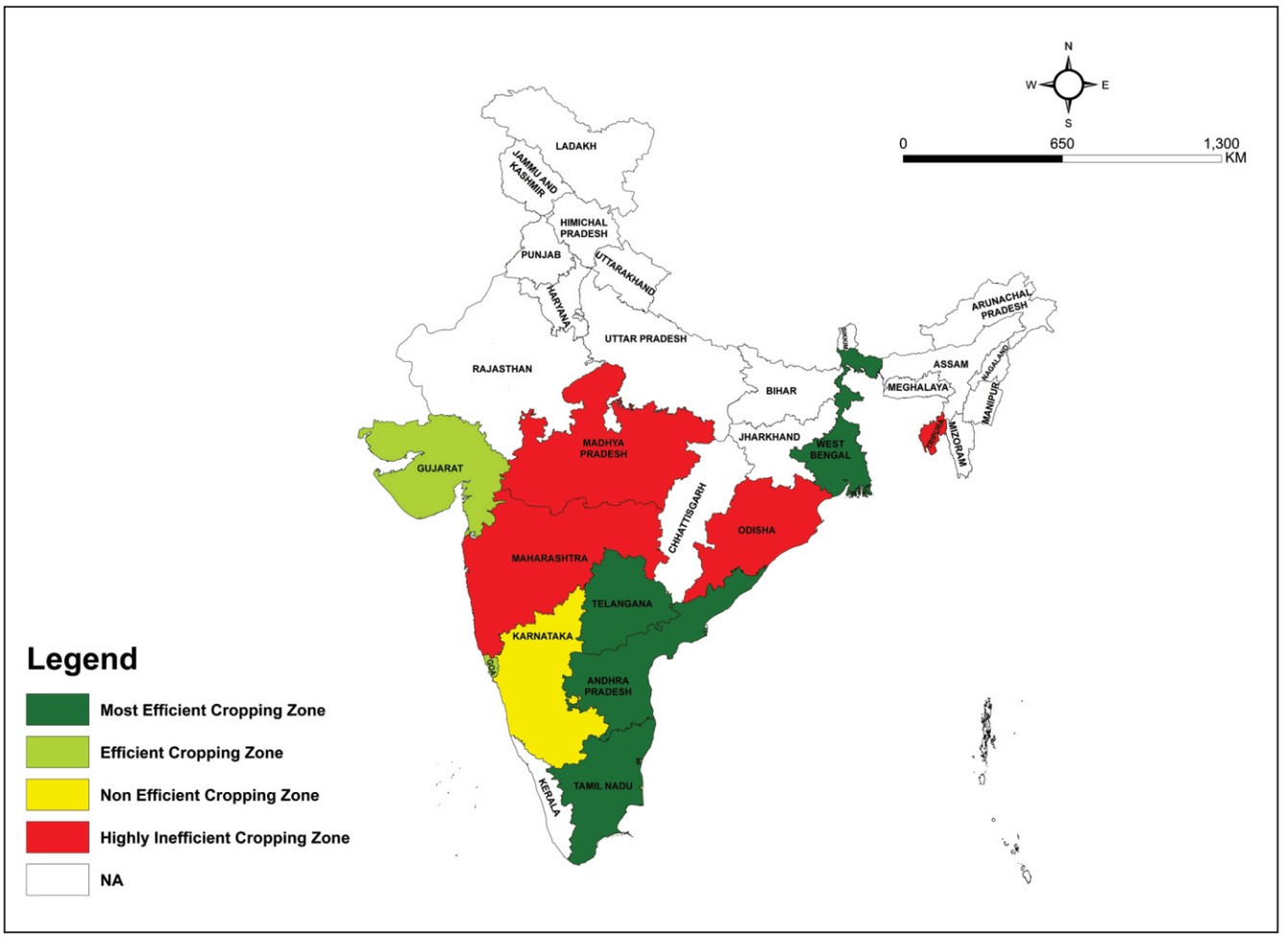
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	01	North Goa
ECZ	Low-High	00	-
NECZ	High-Low	00	-
HICZ	Low-Low	00	-

Fig. 46: Efficient cropping zones of *Kharif* groundnut in Puducherry

Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	01	Pondicherry
ECZ	Low-High	00	-
NECZ	High-Low	00	-
HICZ	Low-Low	00	-

IV. Efficient cropping zones (states) for *rabi-summer* groundnut in India

Fig. 47: Efficient cropping zones for *rabi-summer* groundnut in India

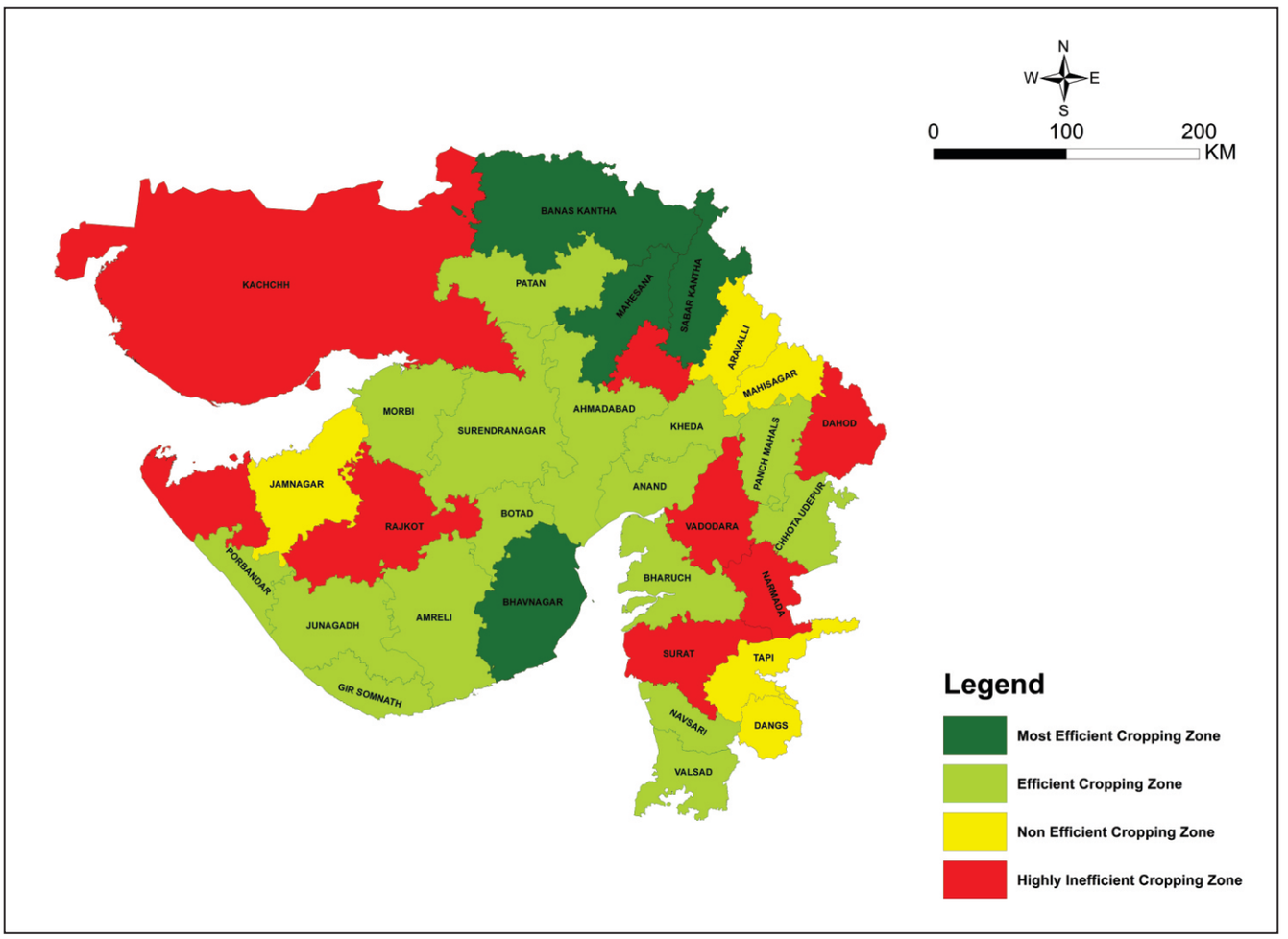


Efficiency	RSI-RYI	No. of States	Name of state
MECZ	High-High	04	Andhra Pradesh, Tamil Nadu, Telangana, West Bengal
ECZ	Low-High	03	Goa, Gujarat, Puducherry
NECZ	High-Low	01	Karnataka
HICZ	Low-Low	04	Madhya Pradesh, Maharashtra, Odisha, Tripura

V. Efficient Cropping Zones (districts) for *rabi/rabi*-summer groundnut

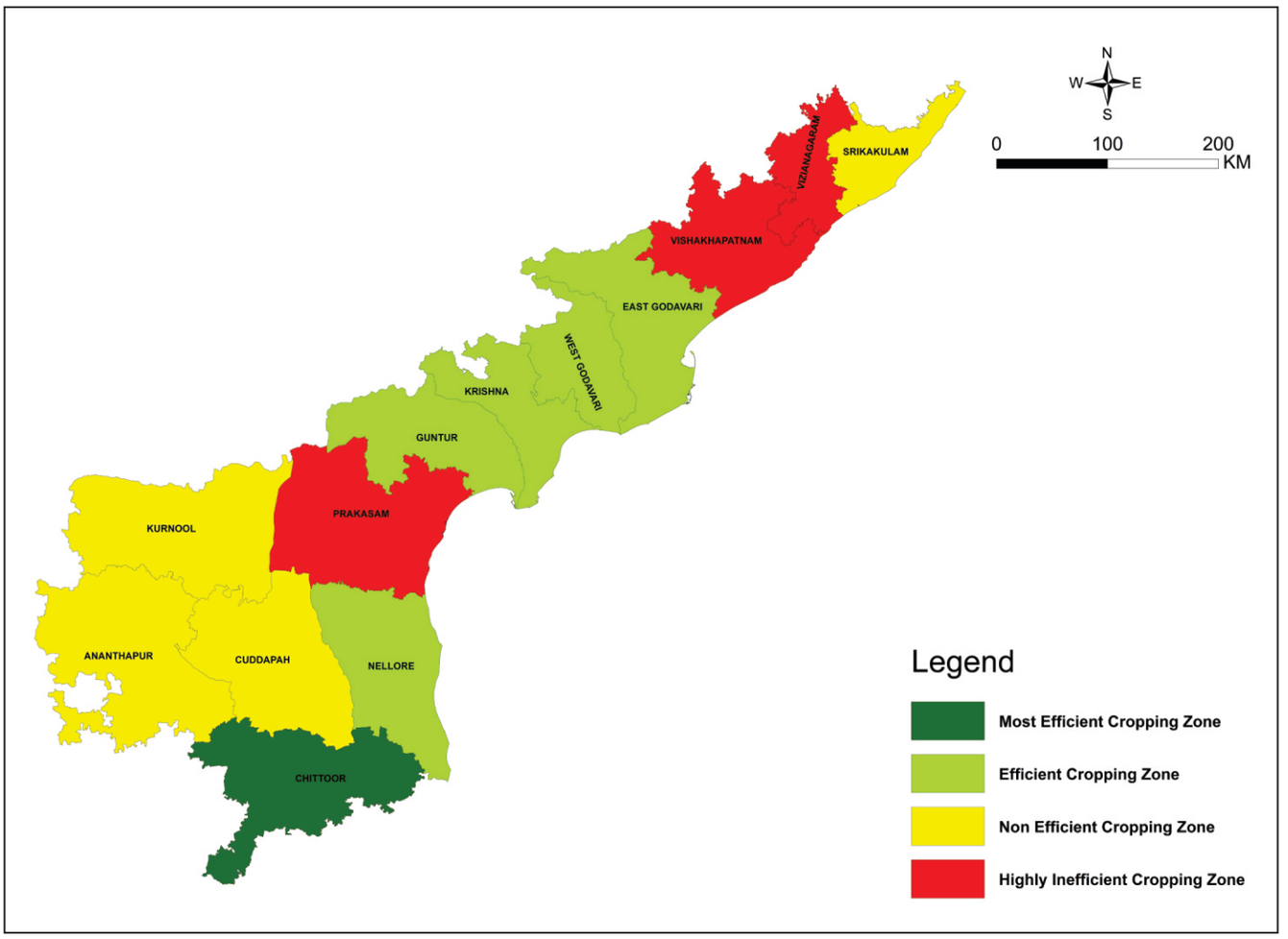
a.Traditional groundnut growing states

Fig. 48: Efficient cropping zones for *summer* groundnut in Gujarat



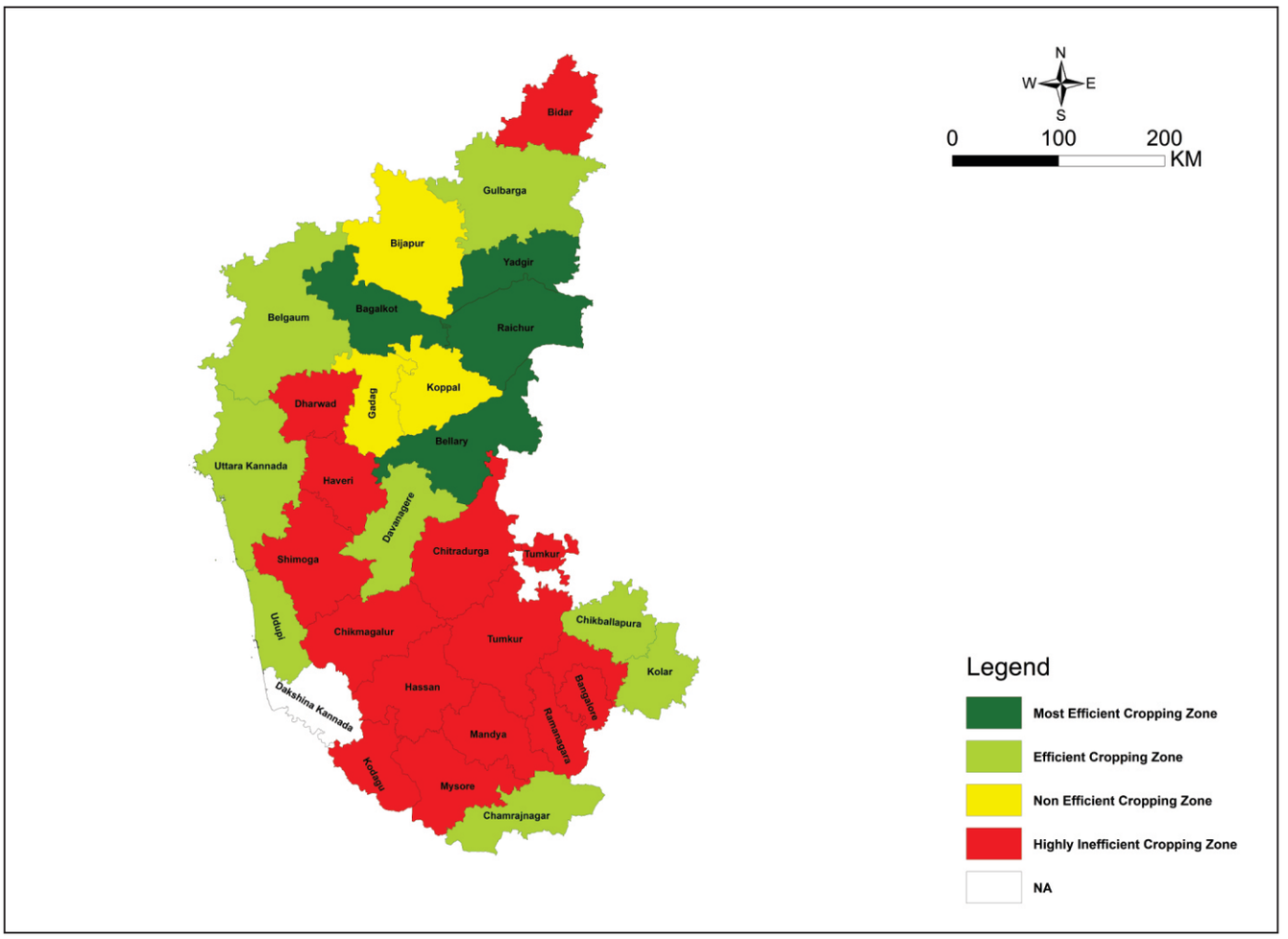
Efficiency	RSI-RYI	No. of Districts	Name of state
MECZ	High-High	04	Banaskantha, Bhavnagar, Mahesana, Sabarkantha
ECZ	Low-High	16	Anand, Amreli, Ahmedabad, Bharuch, Botad, Chhotaudepur, Junagadh, Kheda, Morbi, Navsari, Panchmahal, Patan, Surendranagar, Gir somnath, Porbandar, Valsad
NECZ	High-Low	05	Aravalli, Dang, Jamnagar, Mahisagar, Tapi,
HICZ	Low-Low	08	Devbhumi dwarka, Dahod, Gandhinagar, Kachchh, Narmada, Rajkot, Surat, Vadodara

Fig. 49: Efficient cropping zones for *rabi* groundnut in Andhra Pradesh



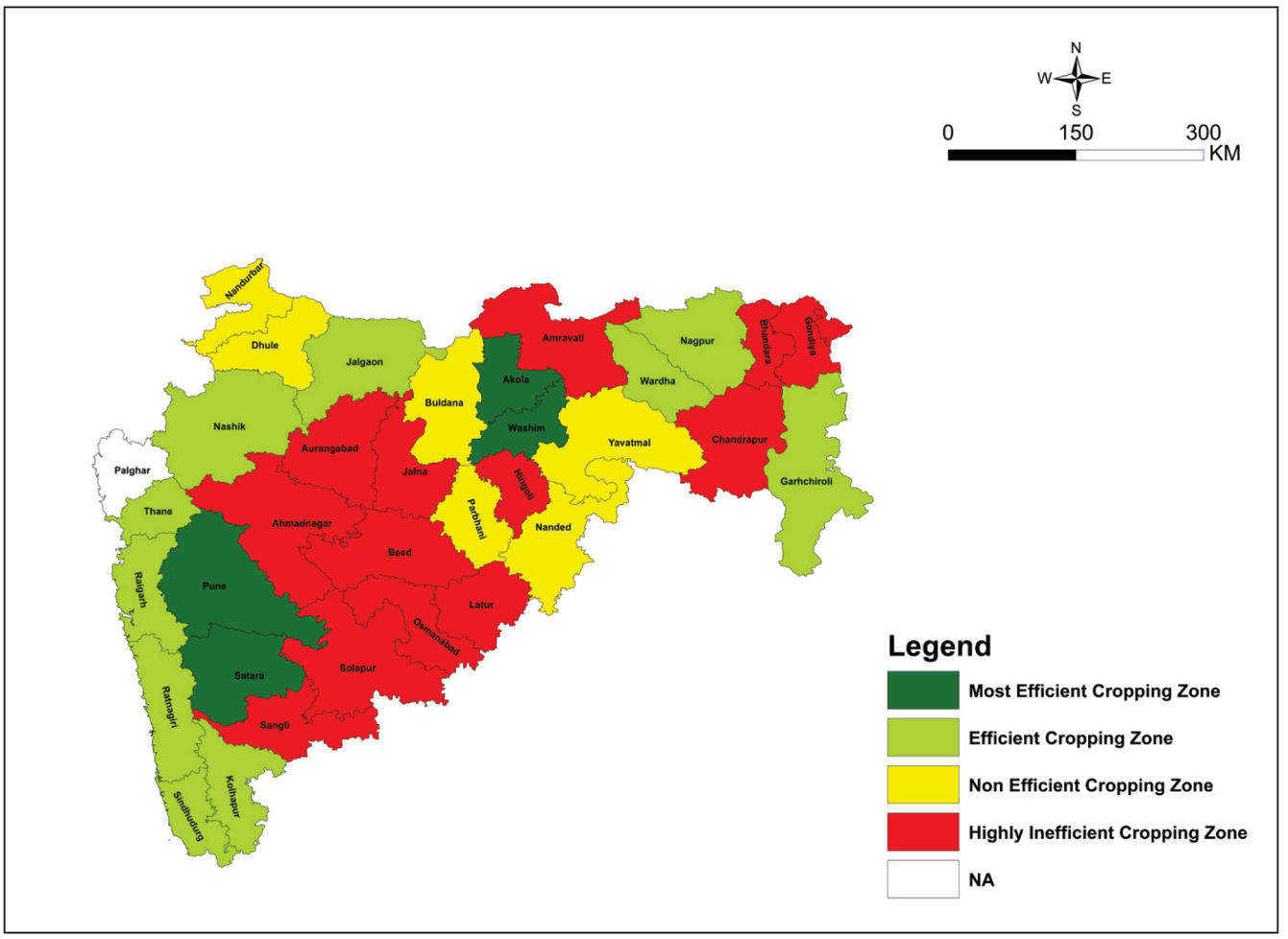
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	01	Chittoor
ECZ	Low-High	05	East Godavari, Guntur, Krishna, SPSR Nellore, West Godavari
NECZ	High-Low	04	Anantapur, Kadapa, Kurnool, Srikakulam
HICZ	Low-Low	03	Prakasam, Visakhapatanam, Vizianagaram

Fig. 50: Efficient cropping zones for *rabi-summer* groundnut in Karnataka



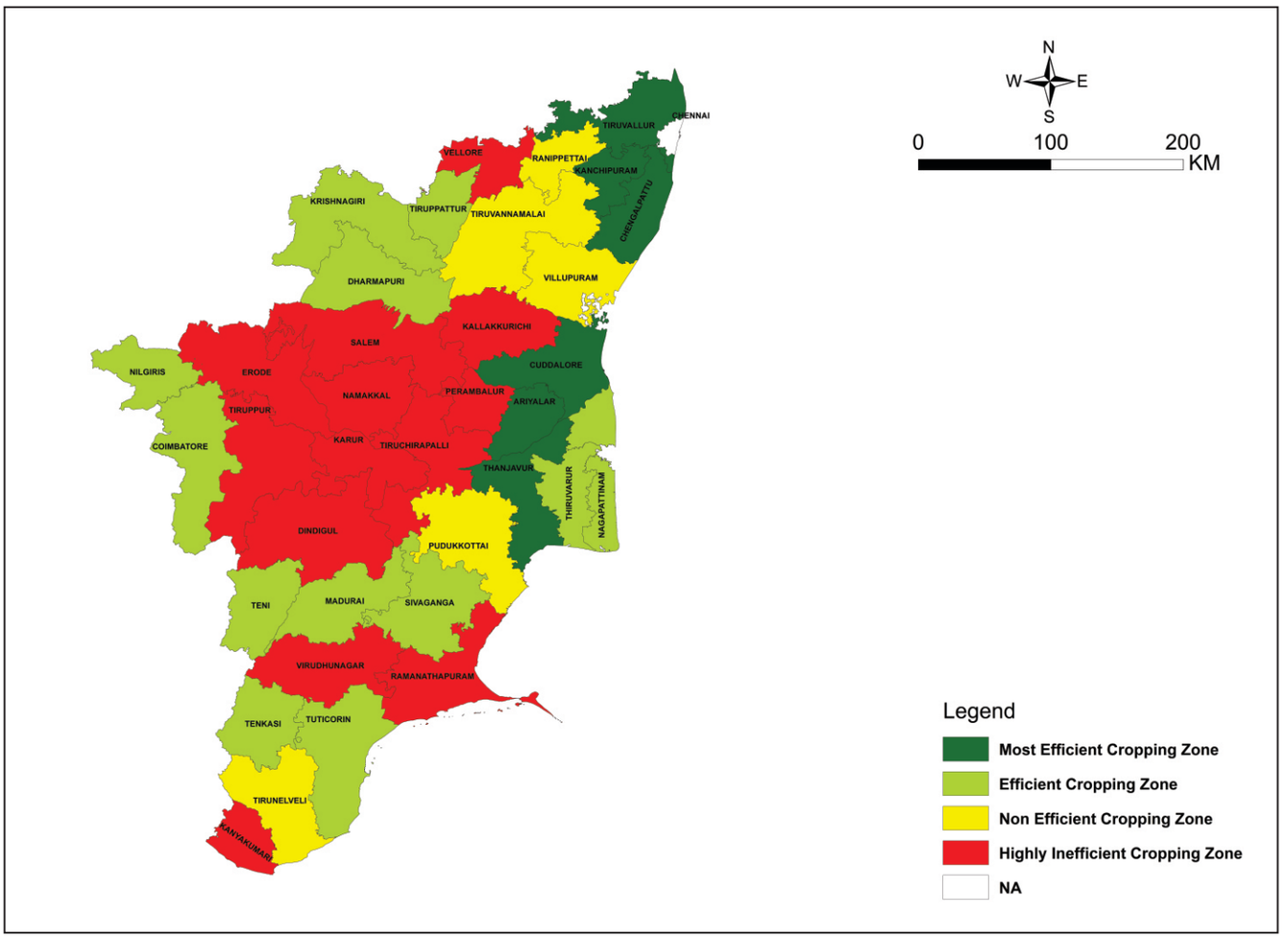
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	04	Bagalkot, Bellary, Raichur, Yadgir
ECZ	Low-High	08	Belgaum, Chamarajanagar, Chikballapur, Davangere, Gulbarga, Kolar, Udupi, Uttar Kannada
NECZ	High-Low	03	Bijapur, Gadag, Koppal
HICZ	Low-Low	14	Bangalore Rural, Bengaluru Urban, Bidar, Chikmagalur, Chitradurga, Dharwad, Hassan, Haveri, Kodagu, Mandya, Mysore, Ramanagara, Shimoga, Tumkur

Fig. 51: Efficient cropping zones for *summer* groundnut in Maharashtra



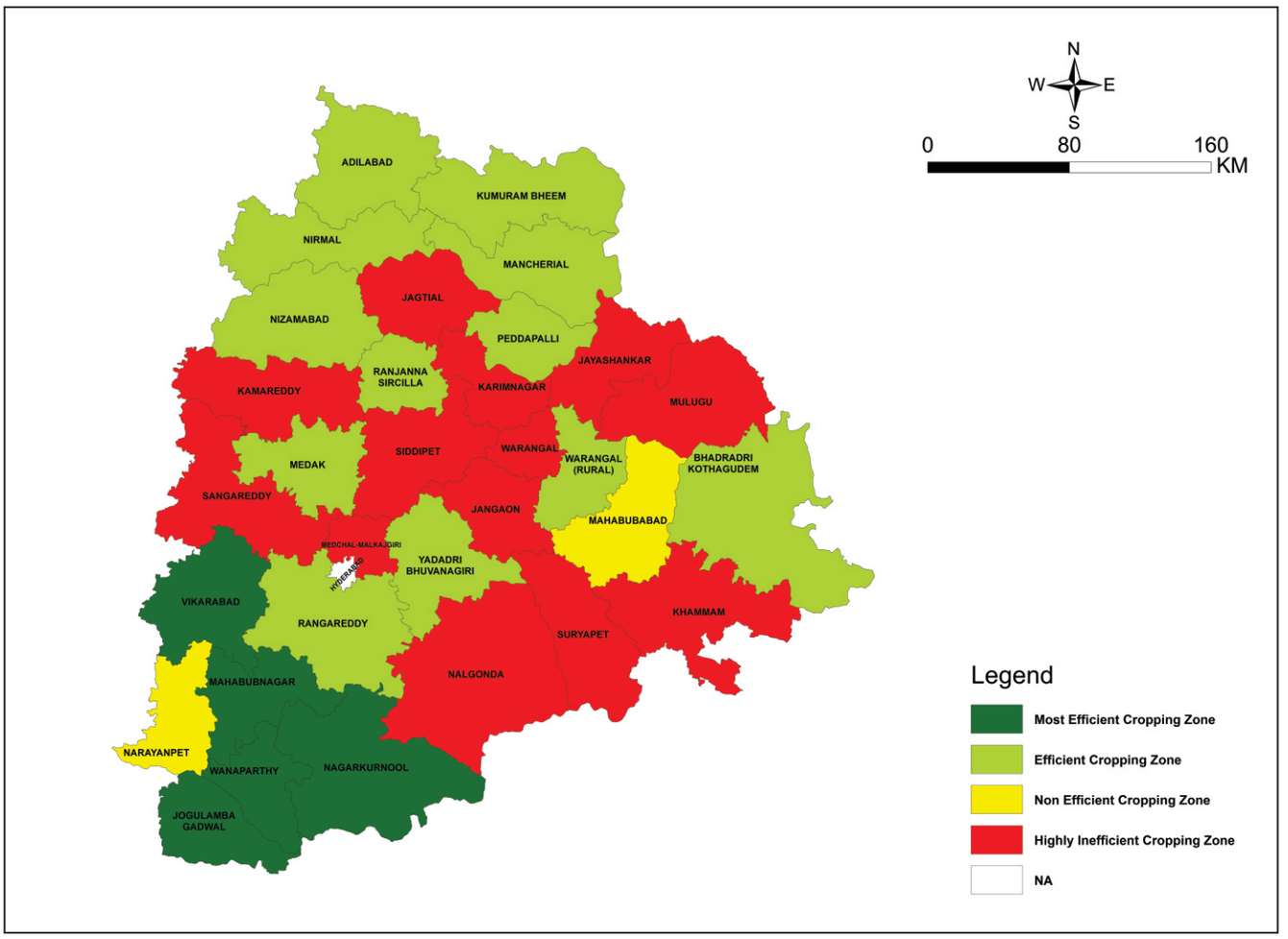
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	04	Akola, Pune, Satara, Washim
ECZ	Low-High	10	Gadchiroli, Jalgaon, Kolhapur, Nagpur, Nashik, Raigad, Ratnagiri, Sindhudurg, Thane, Wardha
NECZ	High-Low	06	Buldhana, Dhule, Nanded, Nandurbar, Parbhani, Yavatmal
HICZ	Low-Low	13	Ahmednagar, Amravati, Aurangabad, Beed, Bhandara, Chandrapur, Gondia, Hingoli, Jalna, Latur, Osmanabad, Sangli, Solapur

Fig. 52: Efficient cropping zones for *rabi* groundnut in Tamil Nadu



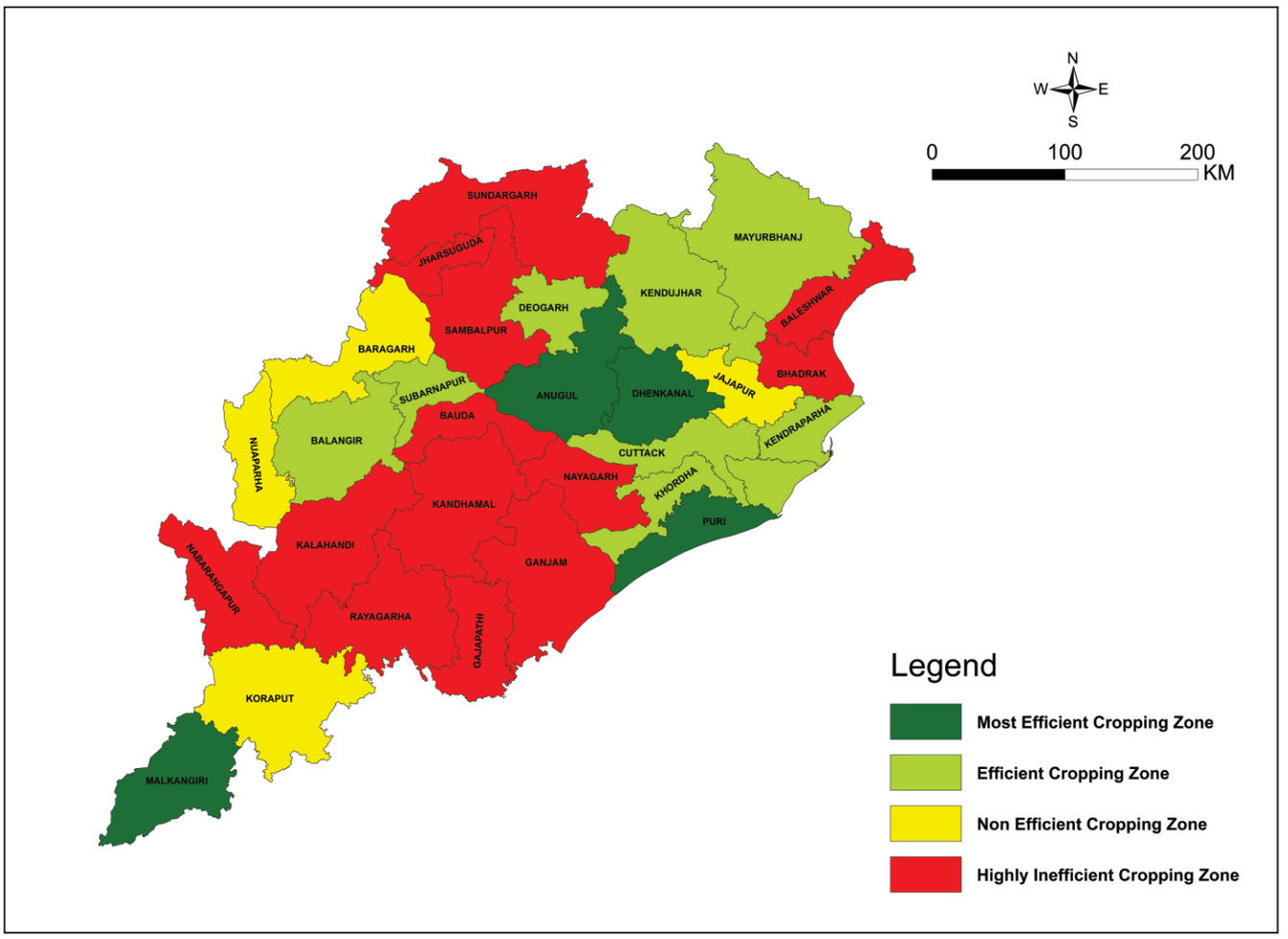
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	07	Ariyalur, Chengalpattu, Cuddalore, Kanchipuram, Mayiladuthurai, Thanjavur, Thiruvallur
ECZ	Low-High	13	Coimbatore, Dharmapuri, Krishnagiri, Madurai, Nagapattinam, Sivaganga, The Nilgiris, Theni, Thenkasi, Thiruvarur, Thoothukudi, Tirunelveli, Tirupathur
NECZ	High-Low	04	Pudukkottai, Ranipet, Tiruvannamalai, Villupuram
HICZ	Low-Low	13	Dindigul, Erode, Kallakurichi, Kanniyakumari, Karur, Namakkal, Perambalur, Ramanathapuram, Salem, Tiruchirappalli, Tiruppur, Vellore, Virudhunagar

Fig. 53: Efficient cropping zones for *rabi* groundnut in Telangana



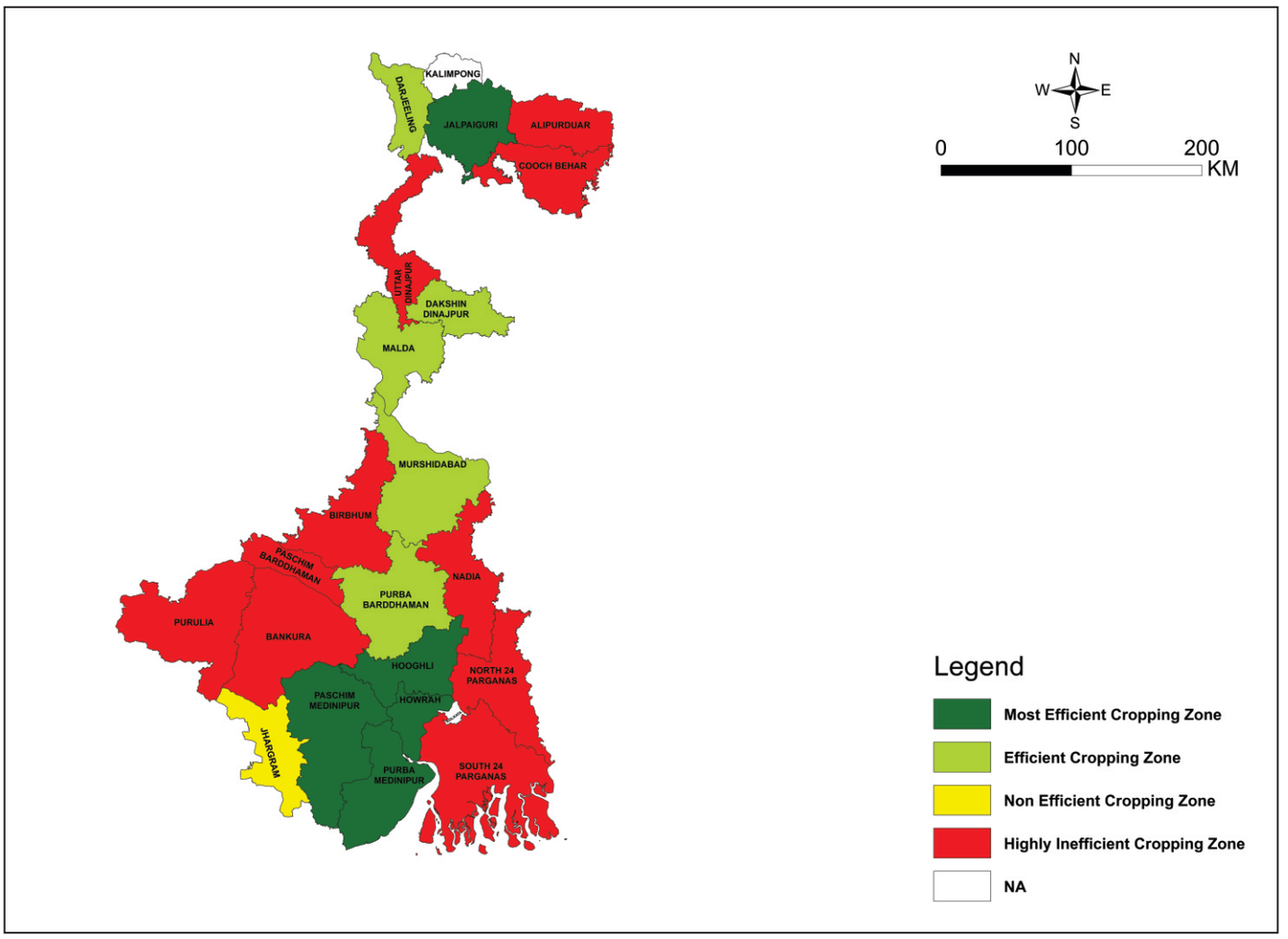
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	05	Jogulamba, Mahbubnagar, Nagarkurnool, Vikarabad, Wanaparthy
ECZ	Low-High	12	Adilabad, Bhadradri, Komaram Bheem Asifabad, Mancherial, Medak, Nirmal, Nizamabad, Peddapalli, Rajanna, Rangareddi, Warangal, Yadadri
NECZ	High-Low	02	Mahabubabad, Narayanapet
HICZ	Low-Low	13	Jagitial, Jangoan, Jayashankar, Kamareddy, Karimnagar, Khammam, Medchal, Mulugu, Nalgonda, Sangareddy, Siddipet, Suryapet, Warangal Urban

Fig. 54: Efficient cropping zones for *rabi-summer* groundnut in Odisha



Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	04	Anugul, Dhenkanal, Malkangiri, Puri
ECZ	Low-High	09	Balangir, Cuttack, Deogarh, Jagatsinghapur, Kendrapara, Kendujhar, Khordha, Mayurbhanj, Sonepur
NECZ	High-Low	04	Bargarh, Jajapur, Koraput, Nuapada
HICZ	Low-Low	13	Baleshwar, Bhadrak, Boudh, Gajapati, Ganjam, Jharsuguda, Kalahandi, Kandhamal, Nabarangpur, Nayagarh, Rayagada, Sambalpur, Sundargarh

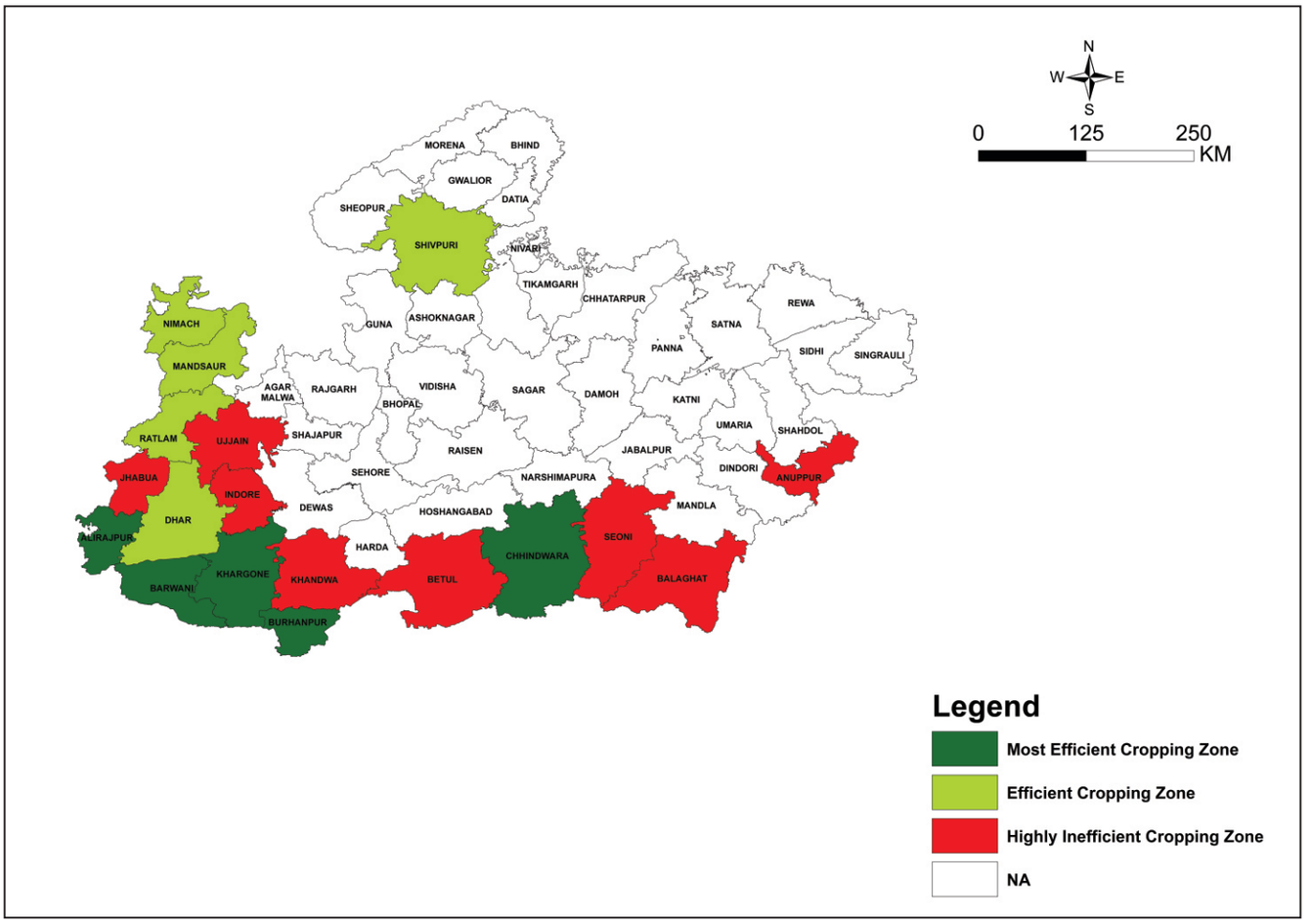
Fig. 55: Efficient cropping zones for *rabi*-summer groundnut in West Bengal



Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	05	Hooghly, Howrah, Jalpaiguri, Medinipur East, Medinipur West
ECZ	Low-High	05	Darjeeling, Dinajpur Dakshin, Maldah, Murshidabad, Purba Bardhaman
NECZ	High-Low	01	Jhargram
HICZ	Low-Low	10	24 Paraganas North, 24 Paraganas South, Alipurduar, Bankura, Birbhum, Coochbehar, Dinajpur Uttar, Nadia, Paschim Bardhaman, Purulia

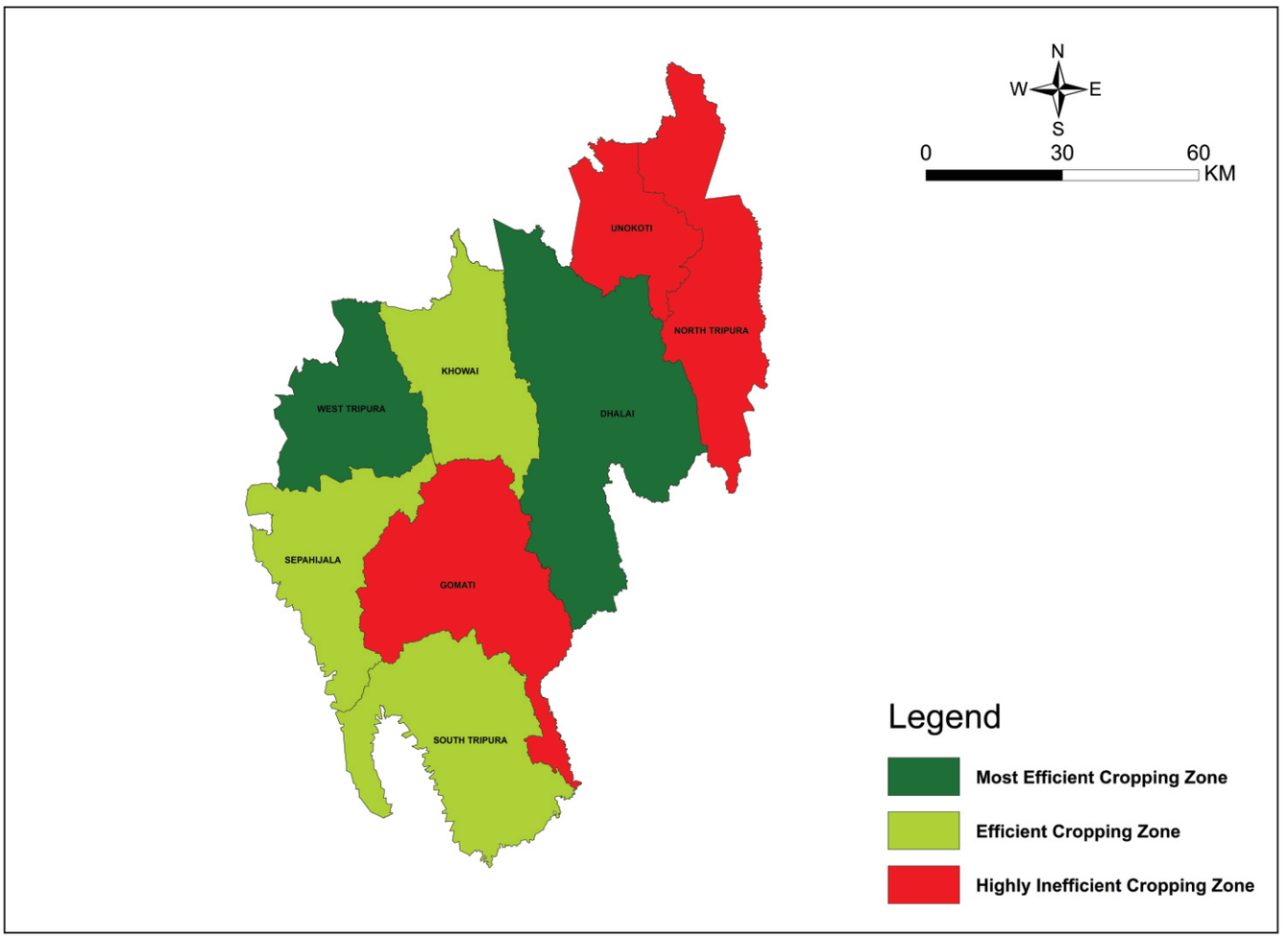
b. Non - traditional groundnut growing states

Fig. 56: Efficient cropping zones for summer groundnut in Madhya Pradesh



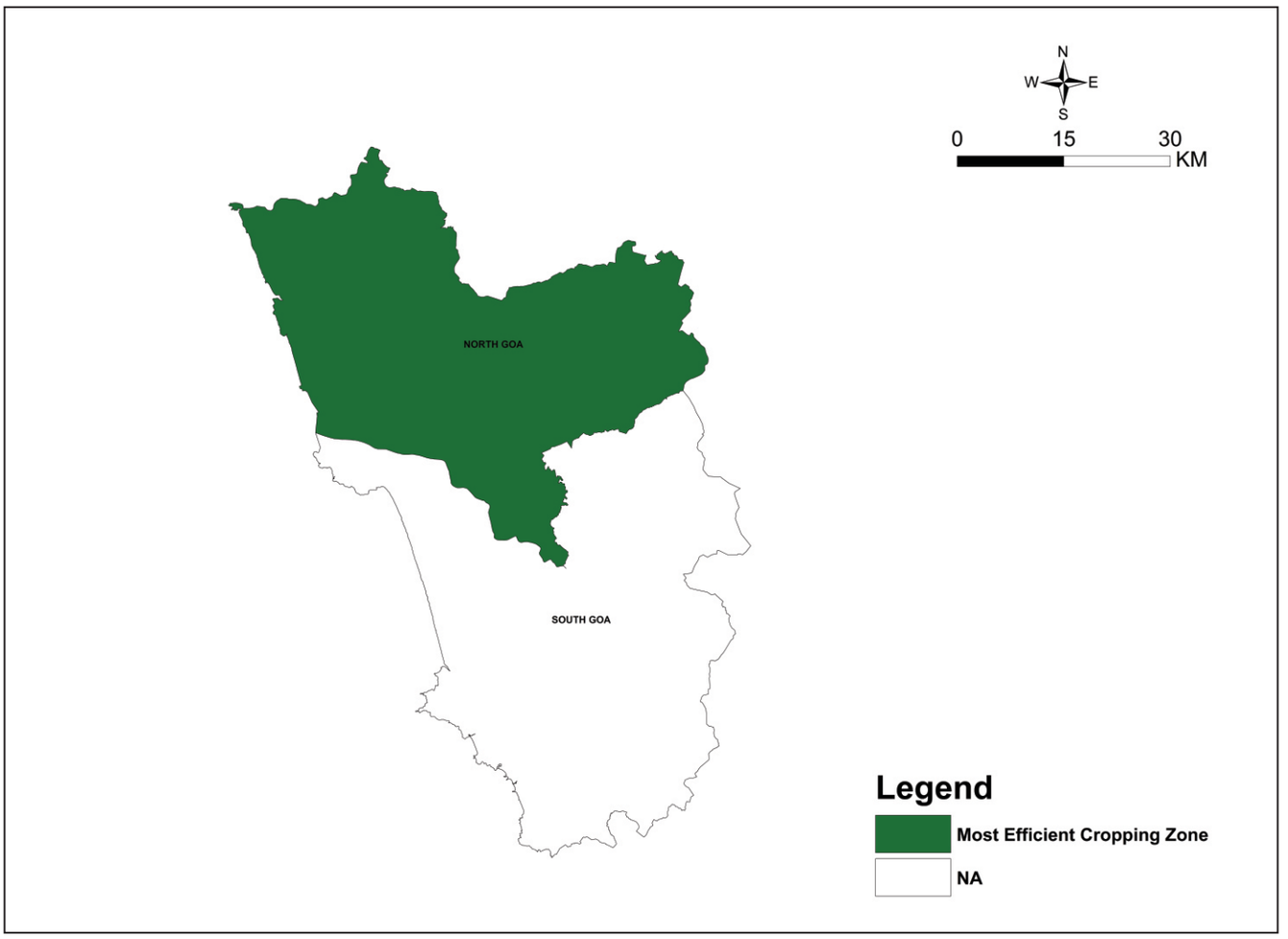
Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	05	Alirajpur, Barwani, Burhanpur, Chhindwara, Khargone
ECZ	Low-High	05	Dhar, Mandsaur, Neemuch, Ratlam, Shivpuri
NECZ	High-Low	00	-
HICZ	Low-Low	08	Anuppur, Balaghat, Betul, Indore, Jhabua, Khandwa, Seoni, Ujjain

Fig. 57: Efficient cropping zones for *rabi* groundnut in Tripura



Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	02	Dhalai, West Tripura
ECZ	Low-High	03	Khowai, Sepahijala, South Tripura
NECZ	High-Low	00	-
HICZ	Low-Low	03	Gomati, North Tripura, Unakoti

Fig. 58: Efficient cropping zones for *rabi* groundnut in Goa



Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	01	North Goa
ECZ	Low-High	00	-
NECZ	High-Low	00	-
HICZ	Low-Low	00	-

Fig. 59: Efficient cropping zones for *rabi*-summer groundnut in Puducherry

Efficiency	RSI-RYI	No. of Districts	Name of Districts
MECZ	High-High	01	Pondicherry
ECZ	Low-High	00	-
NECZ	High-Low	00	-
HICZ	Low-Low	01	Karaikal

Table 02: Summary of state wise efficient cropping zones (*Kharif*)

State	No. of groundnut growing districts	MECZ	ECZ	NECZ	HICZ
Traditional states					
Gujarat	33	07	07	05	14
Andhra Pradesh	13	00	06	03	04
Rajasthan	33	07	14	04	08
Karnataka	30	02	13	06	09
Maharashtra	31	05	13	02	11
Tamil Nadu	38	05	11	05	17
Telangana	32	02	15	03	12
Total	**210**	**28**	**79**	**28**	**75**
Area under traditional states (lakh ha)	**40.46**	**15.06**	**2.05**	**20.80**	**2.54**
Non-traditional states					
Madhya Pradesh	49	03	20	05	21
Uttar Pradesh	65	04	08	13	40
Haryana	13	03	07	00	03
Punjab	02	00	01	01	00
Chhattisgarh	27	05	08	03	11
Jharkhand	24	05	05	02	12
Tripura	08	02	02	01	03
Bihar	09	01	02	00	06
Nagaland	11	03	02	01	05
Uttarakhand	08	01	05	02	00
Arunachal Pradesh	14	01	03	04	06
Himachal Pradesh	06	02	01	00	03
Goa	01	01	00	00	00
Puducherry	01	01	00	00	00
Total	**238**	**32**	**64**	**32**	**110**
Area under Non-traditional states (lakh ha)	**4.64**	**2.08**	**0.41**	**1.91**	**0.23**

Table 03: Summary of state wise efficient cropping zones (*Rabi*-summer)

State	No. of groundnut growing districts	MECZ	ECZ	NECZ	HICZ
Traditional states					
Gujarat	33	04	16	05	08
Andhra Pradesh	13	01	05	04	03
Karnataka	29	04	08	03	14
Maharashtra	33	04	10	06	13
Tamil Nadu	37	07	13	04	13
Telangana	32	05	12	02	13
Odisha	30	04	09	04	13
West Bengal	21	05	05	01	10
Total	**228**	**34**	**78**	**29**	**87**
Area under traditional states (lakh ha)	**7.56**	**3.39**	**0.68**	**2.46**	**1.04**
Non-traditional states					
Madhya Pradesh	18	05	05	00	08
Tripura	08	02	03	00	03
Goa	01	01	00	00	00
Puducherry	02	01	00	00	01
Total	**29**	**09**	**08**	**00**	**12**
Area under Non-traditional states (lakh ha)	**0.059**	**0.043**	**0.008**	**00**	**0.008**

Conclusion and policy Implications

1. In *Kharif* season, out of 448 districts of traditional and non-traditional states, 143 districts are Efficient Cropping Zones and 60 districts are Non-Efficient Cropping Zones contributing more than 25 lakh ha, which is nearly 66 per cent to total *kharif* area.
2. *Rabi*-summer season, out of 257 districts, 86 districts are Efficient Cropping Zones and 29 are Non-Efficient Cropping Zones have which together contributing more than 3 lakh ha, which is about 42 per cent of total *rabi-summer* area.
3. Hence, area expansion measures may be taken up in the zones (districts) that are classified as Efficient Cropping Zone (ECZ) by ensuring timely availability of sufficient quality seeds, through FLDs, training and awareness programmes on improved crop management practices etc.
4. Technological interventions in the form of development and distribution of High-Yielding Varieties may be taken up in the zones (districts) that are categorized as Non-Efficient Cropping Zones where yield is low.

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