VISION 2030

FOOD FOR ALL

KRISHI VIGYAN KENDRA KHOWAI TRIPURA
(A POLICY ARTICLE)

PROSPERITY THROUGH AGRICULTURE

Year: 2021
Publication No:2021(1)

Prepared, Compiled & Edited by

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This publication has been complied based on agricultural/ livestock/ fisheries census for easy to implementation of different commodity sector wise at district level through different organizations.

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FORWARD

Agriculture & Allied activities mainly crops, animal husbandry, fisheries and forestry continue to be the main stay for the overwhelming majority of the people of Tripura. It has been a major contributor to GSDP of the State and employs more than 75% of the total work force. In the recent years the ICAR- ATARI VII has assigned significant priorities to the development of agriculture and agri business in the region. Apart from food grains there has been increase of production in fruits, vegetables, condiments and spices and also pulses and oils. Despite the improvements and increase in production there are a lot of gaps which are required to be filled in order to achieve self sufficiency and to improve productivity to achieve economically and commercially viable levels. With a view to achieve this objective, an effort has been made by the KVK Khowai, Tripura to bring out the vision document, VISION 2030- "Food for All." It is hoped that this vision document will serve as a guide not only for Agri & Allied Departments but for the people of the State in general and in order to achieve this goal in the years ahead and to improve the economy of the State and people making Tripura a better place to live in.

I take this opportunity to express sincere appreciation to Dr. Manoj Singh Sachan, Senior Scientist & Head along with his team of KVK Khowai, Tripura for bringing out such a comprehensive document that will be useful to practitioners and policy makers alike.

Date: 22.12.2021

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PREFACE

Agriculture and allied sector is the pivotal sector for ensuring food and nutritional security, sustainable development and for alleviation of poverty. It is the key sector for generating employment opportunities for the vast majority of the population in Khowai district of Tripura. Since quite some time, agriculture sector, as a whole, has been confronted with numerous challenges linked to food and energy crisis coupled with climate change and degradation of natural resources. Recently all sectors hampered due to COVID-19 crisis but in this period agriculture and allied sector only saved the humankind from poverty. This sector also influences essential ecosystem services such as water and carbon sequestration.

As per estimate of 2016-17, there were 32079 nos. of farming families out of 83888 nos. of total families in the district where total population was 399850 heads but more the 75% people are involved with agriculture and allied sector for regular works. Gross cropped area in the district was 61849.0 Ha where net cropped area was 33213.0 ha. Therefore there is scope for further expansion of net cropped area for this efficient strategic plan is required. Vision 2030: Food for All is aimed serve the purpose in this regard. Production target of 88964.0MT food grains was targeted in year 2016-17 where requirement for the district was 89566.0MT with a deficient production of 602.0MT for the year and additional production necessary over last year was 1665.0MT. To achieve the sufficient production to eliminate the gap proper planning and execution are required where Vision 2030 will play a pivotal role.

Conservation of natural resources, maintenance of biological wealth and acceleration of agricultural growth are considered of paramount importance in the present context as well as of the future. The KVK Khowai is a district level institute sponsored and monitored by ICAR for implementation of agricultural technologies is active in solving problems of agricultural practice in the district through introduction of newer and established technologies. It remains vigilant and responsive to changing scenario through implementation of novel technologies and by promoting problem-solving knowledge products. It envisions challenges that agriculture sector is facing, especially for ensuring food, nutritional and environmental security, and is in the lookout for emerging domestic and global opportunities. Vision 22030 is prepared to address the changes that had taken place, and to articulate new challenges that had emerged. These efforts coincided with the preparation of the annual action plan. It is now realized that agriculture sector would have to face several challenges and threats, along with the opportunities that are emanating from both supply and demand perspectives. An effective agricultural invention-and innovation continuum would play a crucial role in addressing a number of supply-side obstructions and in harnessing numerous demand-side opportunities. The preconditions for making agriculture sector more remunerative and sustainable would be to evolve effective mechanisms for technology delivery and to enhance capacity of all stakeholders in the invention-innovation continuum. **'KVK Khowai Vision 2030'** document narrates key challenges and opportunities in the agricultural sector in the next decade for developing an appropriate strategy and a roadmap to articulate role of KVK Khowai in shaping the future of the agricultural extension for growth, development and equity.

Place: Chebri, Khowai, Tripura **Authors**

Date: 21.12.2021

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THE VISION

"Vision is the future as we foresee"

Aims of the Vision 2030: Food for All by 2030

Objectives of the Vision 2030

By increasing production and productivity in a sustainable way.

Employment generation by establishing agro-based food product and animal feed product industries, so as to increase the per capita income of the farmers and thus achieve food security as a whole.

Attract educated youth toward agricultural activities by utilizing the potential for earning through value addition both for domestic and export markets.

Protect existing forest cover to counter Global Warming by means of awareness generation programmes, and cultivation of fast growing species of trees to meet the requirement of fuel and fodder.

Mission

To converge all activities of agriculture and allied departments to achieve food security by the end of 2030.

1. ABOUT THE DISTRICT

Khowai District of Tripura State was established as per the government decisions vide Notification No. F.4 (62)- RCC/11 in January, 2012 with a population of 3, 71,722 covering an area of 1377.28 Sq.km. The district headquarters located in Khowai town and it consists of two sub-divisions namely Khowai and Teliamura. The district lies between Latitude 23.8974° North and Longitutde 91.6372° East. Average height from sea level is 23m(75ft). Forest area covers 587.224 Sq Km. Climate of the district is monsoon influenced humid subtropical with large amount of rain almost during all the years. The city experiences long, hot and wet summer lasting from April to October. Average temperature remains as 28°C with an average rainfall of 2570mm.

The undivided Khowai had started its administrative set up as sub division of West Tripura since the year 1910 A.D. under SDO, Sri Trivani Kumar Bardhan. Khowai Sub-Division during undivided period was the 2nd largest Sub-Division in Tripura and also among the first 10 established subdivisions in the state.

It was again divided into two Sub-Divisions namely Khowai and Teliamura in the year 2006. The district is flanked by Bangladesh on the North for about 61.5 km, Amarpur and Gandacharra of Gomati district shares boundary of 87km in South, Kamalpur & Ambassa of Dhalai district on the East shares 30 km and Mohanpur and Jirania Sub Division on the West Tripura district in West shares boundary of 46.6 km. The Administrative set up of the District consists of 6 Blocks namely Khowai, Kalyanpur, Teliamura, Tulashikhar, Padmabil, Mungiakami and 3 Revenue Circles and ninteen Tehsils. The location of Khowai District Head Quarter is at Khowai Office tilla. The district consists of 6 assembly constituencies and presently is represented by 6 MLAs in the Legislative assembly. The district contains 124 nos of villages of which 55 nos are Gram Panchayats and 69 nos are ADC villages. There are 25 nos. of Gram Panchayats in Khowai block, 13 in Kalyanpur, 17 in Teliamura where there are 23 nos. of ADC villages in Tulashikhar, 17 nos in Padmabil, 7 nos. in Kalyanpur, Teliamura-8, 14 nos. in Mungiyakami.

The Atharamura Hill range runs along the Eastern side of the District while the Western side is bordered by the Baramura Hill Range. Khowai River, the primary river from which the district also takes its name, starts from its source at Nunacherra of Longtharai Hill range and passes through Khowai Town and discharged in Bangladesh after crom 70 km in Khowai district.

The population consists of Bengalis and Tripuris and both languages i.e. Bengali and Kokborok are spoken. The main festivals in the district are Durga Puja, Saraswati puja, Kharchi and Garia Pooja. Khowai has a rich cultural history and is a well known for its people's movement on literacy (Jan Shiksha Andolan) as well as against Titun Pratha by three sisters Kumari, Madhuti and Rupashri. Tripura celebrates the Martyrs Day on 28th March every year in memory of Rupashri Debbarma, Kumari Debbarma and Madhuti Debbarma. Two Chief

Ministers of the state, Late Nripen Chakraborty and Late Dasrath Deb, also hail from the area. Agriculture is a major source of livelihood for the people of Khowai district of Tripura.

Horticulture is an emerging sector in the district, with greater importance being given to commercial cultivation of exotic flowers and fruits and increasing their export potential. The district is having self sufficient in fish production in terms of seed as well as in table fish production. Topography of Khowai district has hillocks, rivers and plain lands which are very suitable for livestock rearing. Maximum people are non vegetarian so meat industry is promising here. Meat production from all sources is surplus in this district where as there is shortage of production in milk and egg. Fodder cultivation by marginal farmers is very rarely done. Commercial dairy farmers mainly cultivate fodder but these farmers are very less in numbers. Commercial broiler farming is an unorganized sector here so there is no prediction of profit and loss where the merchants dominate the business. Goat farming lies only in hand of poor women but gradually few farmers and entrepreneurs are coming out to rear goat scientifically and commercially. Pig farming is taking its shape as industry still backyard rearing with unscientific traditional system of rearing are also abundant. Local chicken and duck are part of every household which needs to be converted to scientific management system. Sheep and rabbits are reared here as hobby and meat is not preferred. Buffalo farming is not evident here but very few people used to rear in one or two numbers. There is huge scope of work in this sector here to enhance economic sustenance to farming community so that more than doubling farmer's income by 2022 can be achieved as per the call by present Honorable Prime Minister of our country. Veterinary sector here is not well organized in both Govt and private level. Government Interventions are not fully efficient in terms of infrastructures, manpower and logistics. Cooperative movement is not at its expected pace. There is huge works to be done in this sector in terms of human resource development, infrastructures, establishment of proper system and supply of logistics. There are huge scope of producing seeds and planting material. Cool storage facilities needs to be optimum to overcome seasonal low price of vegetables.

Table 1. Demographic pattern in Khowai district Tripura.

Sl. No.	Description	As per census 2011
1	Population	3,27,564
2	Population male	1,67,401
3	Population female	160,163
4	Population density (Per Sq Km)	326
5	Female- male ratio (every 1000)	957: 1000
6	Population of 0- 6 age group	38,659 (male- 19,657; Female- 19,002)
7	Scheduled tribe population	1,39,537 (Rural- 1,38,104; Urban- 1433)
8	% of scheduled tribes to total population	42.60
9	Scheduled castes population	63,062 (Rural- 55,620; Urban- 7442)
10	% of scheduled castes to total population	19.25
11	Literacy rate (%)	87.78
12	Literacy rate (%) of male	92.17
13	Literacy rate (%) of female	83.17

The total population of the district was 327564 with 167401 adult males, 160163 adult females and 38659 children (below 6 years of age). Out of total population 42.60 and 19.25% population was Scheduled tribe and Scheduled castes respectively. The estimated population density was 326 per square kilometer along with 87.78% literacy rate (Table 1).

Table 2. Metrological information of 2020 (Source: AWS, KVK Khowai Tripura).

Sl. No.	Months	Temperature (C^0)		Humidity (%)		Rainfall (mm)	No. of rainy days
		Maximum	Minimum	Maximum	Minimum		
1	January	24.48	10.81	92.77	57.68	16.40	3
2	February	26.93	9.72	92.03	49.17	4.50	1
3	March	32.68	16.93	93.97	34.03	3.90	1
4	April	32.83	21.80	91.54	46.77	168.10	14
5	May	32.03	22.55	91.07	51.58	239.30	25
6	June	30.96	24.03	84.43	50.70	246.80	30
7	July	30.22	31.68	83.03	50.00	258.87	31
8	August	31.13	24.77	78.52	47.64	202.10	31
9	September	30.93	24.40	79.97	48.50	206.40	29
10	October	31.32	23.38	73.90	45.87	110.50	17
11	November	29.67	17.07	61.97	42.06	12.40	4
12	December	26.51	12.10	60.87	39.29	0.00	0
Average	-	**29.97**	**19.93**	**82.00**	**46.94**	-	-
Total	-	-	-	-	-	**1469.87**	**186**

The data on table 2 shows that the temperature, humidity, rainfall and no. of rainy days of the district was recorded and it is evident that the minimum temperature in the Khowai district is 9.72° Celsius (February) and highest temperature is 32.83° Celsius (April). The mean average maximum atmospheric temperature is 29.97^0C and the minimum 19.93^0C. The annual average rainfall of Khowai district is 1470 mm along with 186 rainy days besides, humidity between 82 to 47% was also observed in Automatic Weather Station, situated at KVK Instructional Farm, Chebri, Khowai.

Rainfall pattern of Khowai district especially showed in June to September months which comes in Kharif season are depicted in table 2. The district has received deficient rainfall ranges from (-8.48 to -42.82) except 2014 and 2019 as compared to the normal rainfall. Dry spells period (91 to 120 days) in a year and maximum and minimum number of rainy days (183 to 66) were also recorded between the period of 2011 to 2020 resulting crops experiencing the impact of dry spells and drought like situation at grain filling and maturity stages (Table 3).

Table 3. Rainfall pattern of Khowai district during the year 2011 to 2020 at AWS KVK Khowai Tripura.

Year/ Month	Normal	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
June	420.6	402.6	524	309	483.6	115	11.5	582.6	374.6	308	246.8
July	294.6	264.4	209.6	128.6	110.2	347.5	347.5	227.4	250.3	304.8	258.87
August	293.7	363	208	234.8	451.8	203.5	203.5	455.6	192.1	253.2	202.1
September	221.5	96	160.8	267.6	300.6	178.5	141	246.4	165.3	147.6	207.4
Total kharif rainfall (mm)	1230.4	1126	1102.4	940	1346.2	844.5	703.5	1512	982.3	1013.6	915.17
Deviation (%) = Actual-Normal / Normal* 100		-8.48	-10.40	-23.60	9.41	-31.36	-42.82	22.88	-20.16	-17.62	-25.62
Number of dry spells		107 days	91 days	96 days	106 days	103 days	86 days	92 days	117 days	120 nos.	119 nos.
Duration of dry spells (>10 days)		4	3	3	3	2	1	-	-	2	2
>15 days		1	2	1	1	1	1	1	1	1	2
>20 days		2	1	2	2	3	3	4	6	4	1
Number of rainy days		78 days	92 days	85 days	66 days	72 days	83 days	94 days	183 days	174 days	179 days

2. STRENGTH, WEAKNESS, OPPORTUNITY & THREATS (SWOT) ANALYSIS

In the light of the above scenario, present strategic document has been prepared keeping in view the Strength, Weaknesses, Opportunities and Threats (SWOT) in the Khowai district (Table 4) to support the population dependent on agriculture, horticulture, livestock & poultry, fishery and forestry sector for their sustainability, profitability as well as poverty reduction.

Table 4. SWOT ANALYSIS OF AGRICULTURAL AND ALLIED SECTOR.

STRENGTHS (Helpful) Internal Origin	**WEAKNESSES (Harmful) Internal Origin**
• Favorable agro climatic condition. • Support from the Govt. Departments. • Fertile and hill slope lands suitable for various crops. • Availability of family labour. • Scope for attracting educated youth towards cultivation. • High demand in domestic market. • Suitable for rearing different livestock and bird. • Abundant grazing land. • Use of family labour. • Farmers aware of livestock rearing.	• Fragmented land holding. • Lack of irrigation facilities during lean period. • High price of quality seeds and planting materials. • Minimum number of Agro-input outlets. • Non adoption of modern technology by the farmers. • Low maintenance of farm orchards. • Low capital investment in the farm. • Less use of modern practices of nutrient management. • Lack of post harvest management and

• Locally available fodder and feed. • Disease resistant local breed. •Indigenous knowhow of animal and poultry rearing. •Rich and diverse natural resources •Varied ago-ecological zones which favour rearing various fish species. • Low lands area are available for fish farming. • Demand in the domestic market. • Sufficient rainfall. • Local production of fish seed. • Forest as a source of livelihood of the people. • Rich in bio-diversity. • The proportion of area under forest is high. • Availability of plywood mill. • Sufficient fertile cultivable land. • Favorable agro-climatic condition. • More farming families. •Presence of different Agriculture & allied departments including KVK. More than 100 farmers clubs have been established for better technology dissemination and rapid extension services. Forest as a source of livelihood of the people. Rich in bio-diversity. The proportion of area under forest is high. a. District having enough area coverage with grasses, bushes and forest trees which can be utilized for organized feed ingredient and fodder cultivation. b. Farmers having traditional knowledge and practice of rearing livestock. c. Non vegetarian food habit of people is good strength for livestock development in the district.	processing facilities. • Low investment in the sector and reared in traditional way with zero input system for rearing of livestock and poultry sector. • Lack of improve breed. • Inadequate animal and poultry health care. • Lack of scientific processing and market facilities and infrastructure. • High terrain and remoteness. •Lack of awareness on integrated and composite fish farming. • Acidic soil. • Non availability of quality fingerlings. • Poor communication & transport facilities • Inadequate documentation of plant resources. • Soil erosion. • Deforestation. • Remoteness of the region • Poor transportation and marketing facilities • Improper post harvest and storage management. Inadequate documentation of plant resources. Soil erosion. Deforestation. Firewood collection depletes the forest. New plantation in cultivable areas. No concrete plan to meet the demand of feeds and fodder in normal situation as well as during crisis period. Animal health workers and AI workers are not sufficient in number, also not properly utilized and facilitated. Tendency of farmers to raise livestock on zero or very negligible inputs.
OPPORTUNITIES (Helpful) External Origin • Scope for development of Agri –Market Hub. • Organic cultivation can be promoted. • Good communication facilities with other part of the country. • Scope for intensification and diversification of the crops	**THREATS (Harmful) External Origin** • Farmers shifting to other occupations from agriculture. • Heavy attack of pests and diseases on the crops • Soil erosion and soil fertility degradation. • Unstable market price. • Farmers shifting to other occupations.

• Scope for introduction of high value crops and floriculture. • Scope for establishment of processing industries. • Scope for breed improvement of milch, animal and poultry for high yielding meat. • People adapted to various types of meat. • Scope for integrated farming. • Scope for employment generation. • Scope for introduction of paddy cum fish culture. •Exploiting the riverine stretch. • Good demand of agricultural, livestock and fish products, in neighboring state and country. • Enactment of farmer friendly forest legislation. • Encouragement of joint forest management. • Conservation of natural resources and wildlife. • Sustainable use of existing valuable natural resources. • Exploitation of natural resources. • Preservation and promotion of local medicinal and aromatic plants. • More employment opportunities. • Setting up of distillation plants. • Organizing market networks by tie up with outside buyers. • More income generation for the farmers. • Utilization of waste land where crops cannot be grown. • Scope for market oriented extension system, business development and entrepreneurial skills. • Farmers largely organized into development groups and social networks. • Marshy land can be converted for fish production. • Meat and milk revolution through industrialization of meat and milch animal production can be possible. • Due to popularization of duck egg and meat there is wide scope of promotion for duckery along with poultry in the district.	• Dependency on migrant labour. • Livestock, poultry and fish diseases. • Decline in natural resources. Irrational fishing by using bleaching powder, blasting etc • Fish Diseases. • Shifting cultivation causing loss in forest area. • Increase in demand of fuel, fodder and timber. • Slow adoption of improve technologies. • Risk price fluctuation. • Inadequate technical skills. • Delay in implementation of farm policy. Small farm sizes caused by high population density threaten viability of smallholder farming. Unstable price of agricultural commodities. Low seed replacement ratio. Acidic soil. Shifting cultivation causing loss in forest area. Higher growth trend in prices of feed ingredients and other input in also experienced as a threat.

3. CURRENT STATUS OF AGRICULTURE AND ALLIED SECTORS IN KHOWAI DISTRICT TRIPURA

The perusals in Table 5 reveals that The land use pattern of Khowai district Tripura for the year 2010-11 to 2018-19 indicated the area of forests, area under agricultural uses and non-agricultural uses, land under misc. tree crops and groves not including in net area sown, culturable wasteland, fallow lands has been shown in decreasing trends' mentioned in Table 5. The total cropped area in the district was 52487 ha of which 29372 ha, 23115 ha net sown area and area sown more than once. The total cultivable area 29666 ha, out of which 89, 81, 88 and 36 ha respectively, under Land under misc. tree crops and groves not including in net area sown, culturable wasteland, Fallow land other than current fallow, current fallow. Area has sown more than once increased only by 0.052 per cent and cropping intensity 5.21 percent. Hence, there is a scope for increasing the net sown area and cropping intensity in large area at least 200 per cent by 2030.

Table 5. Land use classification (area in ha) in Khowai district Tripura (Source: Ministry of Agriculture & Farmers Welfare, Govt. of India; Economic Review of Tripura, 2019-20; *DoA, Govt. of Tripura)

Sl. No.	Description	2010-11*	2015-16	2016-17	2017-18	2018-19	% increase/ decrease
1	Reporting area for LUS	92005	92014	92005	89005	89038	-3.22
2	Forest area	54319	54319	54319	54319	54319	0.00
3	Not available for Cultivation						
3 a	Area under non agricultural uses	5066	4985	4987	4748	4759	-6.06
3 b	Barren unculturable land	453	0	0	294	294	-35.10
	Total	**5519**	**4985**	**4987**	**5042**	**5053**	**-8.44**
4 a	Permanent pasture and other grazing land	0.00	0.00	0.00	0.00	0.00	0.00
4 b	Land under misc. tree crops and groves not including in net area sown	120	94	93	92	89	-25.83
4 c	Culturable wasteland	111	90	90	90	81	-27.02
	Total	**231**	**184**	**183**	**182**	**170**	**-26.40**
5	Fallow land						
5 a	Fallow land other than current fallow	128	120	117	113	88	-31.25
5 b	Current fallow	51	37	30	30	36	-29.41
	Total	**179**	**157**	**147**	**143**	**124**	**-30.72**
6	Net area sown	32865	32369	32369	29319	29372	-10.63
7	Area sown more than once	23103	25346	25925	23125	23115	0.052
8	**Total cropped area (6 + 7)**	**55968**	**57715**	**58293**	**52444**	**52487**	**-6.22**
9	Total cultivable area (4 + 5 + 6)	33275	32710	32699	29644	29666	-10.84
10	Cropping intensity (%)	168.17	176.44	178.27	176.91	176.93	5.21

The data in Table 6 shows the increasing trend of area, production and productivity of agricultural crops during last six years (2013-14 to 2019-20) which indicated the positive change for the self sufficiency of food grains in the district. Moreover the area of paddy crops in decreasing trend during the last six years. However, it is the high time to increase the cropping intensity with the increase of area under oilseeds and pulses by utilizing fallow lands specially rice fallow during the winter season by utilizing residual moisture as well as creating infrastructure for irrigation during the lean period. The data in Table 7 indicated that the trend in area, production and productivity of horticultural and vegetables crops during last five years in the Khowai district of Tripura. It shows that the tremendous decrease in plantation crops of coconut and cashew nut with increase in arecanut which indicate the scope of area expansion due to its high profitable and less management of the crops in the district. The high value fruit crop especially strawberry has increased during the last five years though the meager increase in. The area, production and productivity of fruit crops has been decreased during last five years through the meager decrease in area, production and productivity of mango, orange, lime, papaya. Maximum area decreased in fruit crops especially pineapple, jackfruit, litchi and guava due to marketing and non availability of processing industry etc. However, the area production and productivity of spices has also decreased especially ginger, turmeric, black pepper and slightly increased in area, production and productivity of chilli and betel- wine crops due to easily processed at household level.

On the other hand, data in Table 7 on vegetable crops shows that the total vegetable area increased by 7.48 per cent and production by 15.21 per cent which indicated the scope of enhancement of productivity with introduction of high value low volume vegetable crops in the district to meet the requirement to feed the population of the district by 2030. Moreover only single commodity of vegetable crops potato is covering area of 632 ha with the production of 11452 MT.

The data in Table 8 and 9 shows the population trend of livestock and poultry and their growth trend from 2012 and 2019 Livestock Census. It shows that the total cattle, buffalo, goat, sheep population decreased by -48.7, -78.8, -54.0, 74.1 per cent respectively whereas pigs by -58.3 per cent. Only poultry including other birds shows in increasing trends in population 4.5 percent. The present scenario of production of milk (20112354.18 liters), meat (5460107.60 kg) and eggs (35192867 numbers) as per livestock census of 2019-20 are mentioned in table 9. The production of milk, meat and egg in the district percentage change over last six years was shown in instable, negative and deficit trend in the district.

The area, production and productivity of fishery sector in Khowai district are shown in table-10. Altogether 21573 total numbers of farmers involved in fishery sector covering total water area from culture and capture sources 3620 ha with the total fish and prawn production from all sources 8625.005 MT.

Table 6. Area production and productivity of field crops in Khowai district, Tripura 2019-20 and 2013-14. (Figure in parenthesis of each representing *edible portion)

Sl. No.	Name of crop*	2019-20			2013-14			% change over last 6 years		
		Area (ha)	Production (MT)*	Yield (Kg/ ha)	Area (ha)	Production (MT)	Yield (Kg/ ha)	Area (ha)	Production (MT)	Yield (Kg/ ha)
Cereals										
1	Aush paddy (70)	1155	2927 (2048.9)	2534	2453	6097	2486	-52.915	-51.993	1.931
2	Aman paddy (70)	14698	44079 (30855.3)	2999	14610	43196	2957	0.602	2.044	1.420
3	Jhum paddy	1427	1633 (1143.1)	1144	1630	1729	1061	-12.454	-5.552	7.823
4	Boro paddy (70)	6930	21401 (14980.7)	3088	5645	16627	2945	22.764	28.712	4.856
	Total	24210	70040 (49028)	2893	24338	67649	2780	-0.526	3.534	4.065
5	Wheat	20	43	2129	3	6	2000	566.667	616.667	6.450
6	Maize (R)	471	1121	2380	-	-	-	0	0	0
7	Sorghum (R)	133	106	799	-	-	-	0	0	0
8	Maize hybrid	203	429.43	2115	-	-	-	0	0	0
9	Maize local/ composite	980	1117.03	1140	511	613	1200	91.781	82.223	-5.000
10	Sorghum	103	87.29	847	-	-	-	0	0	0
11	Foxtail millet	70	59.12	845	-	-	-	0	0	0
	Total	26190	73002.87 (51990.87)	-	24852	68268	-	5.384	6.936	0
Pulses										
12	Moong (R)- (70)	256	179 (125.3)	700	70	38	543	265.714	371.053	28.913
13	Black gram (R)- (70)	248	183 (128.1)	738	29	18	621	755.172	916.667	18.841
14	Lentil (R)- (70)	261	174 (121.8)	666	160	111	694	63.125	56.757	-4.035
15	Pea (R)- (70)	534	507 (354.9)	950	136	104	765	292.647	387.500	24.183
16	Gram (R)- (70)	16	10 (7.0)	618	43	35	814	-62.791	-71.429	-24.079
17	Kesari (R)- (70)	4	3 (2.1)	645	-	-	-	0	0	0
	Others (R)	-	-	-	242	253	1045	0	0	0
18	Rajmash (R)	102	82	802	-	-	-	0	0	0
19	Arhar- (70)	555	413.94 (289.8)	746	496	341	688	11.895	21.390	8.430
20	Moong- (70)	225	139.76 (97.8)	621	34	17	500	561.765	722.118	24.200
21	Black gram- (70)	89	54.80 (38.4)	616	79	42	532	12.658	30.476	15.789
22	Cow pea	355	263.24	742	-	-	-	0	0	0
23	Rajmash	4	3.77	943	-	-	-	0	0	0
	Others (K)	-	-	-	148	128	865	0	0	0
	Total	2649	2013.51 (1514.21)	-	1437	1087	-	84.342	85.236	0

Oilseeds										
25	Rapeseed/ mustard (R)-(25)	1465	1170 (292.5)	799	378	317	839	287.566	269.085	-4.768
26	Groundnut (R)- (40)	176	266 (106.4)	1509	40	56	1400	340.000	375.000	7.786
27	Soybean (R)-(20)	28	21 (4.2)	747	-	-	-	0	0	0
28	Flex/ Linseed (R)- (30)	85	68 (20.4)	803	-	-	-	0	0	0
29	Sesame (40)	680	381.54 (152.6)	561	280	148	529	142.857	157.797	6.049
30	Groundnut (40)	142	208.76 (83.5)	1470	14	17	1214	914.286	1128.000	21.087
31	Vegetable type soybean (20)	2	1.50 (0.30)	750	-	-	-	0	0	0
	Total	2578	2116.80 (659.9)	-	712	538	-	262.079	293.457	0
Commercial crops										
32	Jute	43	416.13	9.68	38	322	847	13.158	29.233	-98.857
33	Mesta	47	429	9.13	53	417	787	-11.321	2.878	-98.840
34	Cotton	47	66.10	1.41	69	103	149	-31.884	-35.825	-99.054
35	Sugarcane	43	2335.40	54312	48	2668	55583	-10.417	-12.466	-2.287
	Total	180	3246.63	-	208	3510	-	-13.462	-7.503	0

Table 7. Area production and productivity of horticultural crops in Khowai district, Tripura 2019-20 and 2014-15. (Figure in parenthesis of each representing *non edible portion; **edible portion)

Sl. No.	Name of crop*	2014-15			2019-20			% change over last 5 years		
		Area (ha)	Production (Mt)	Yield (Mt/ ha)	Area (ha)	Production (Mt)**	Yield (Mt/ ha)	Area (ha)	Production (Mt)	Yield (Mt/ ha)
Summer vegetables										
1	Bhindi (3)	223	2156	9.6681	322	3065 (2973.05)	9.51863	44.395	42.161	-1.546
2	Brinjal (5)	225	4225	18.7777	231	4220 (4009.00)	18.26839	2.667	-0.118	-2.712
3	Spine guard (5)	99	1952	19.7771	99	1720 (1634.00)	17.37373	0.000	-11.885	-12.152
4	Pointed guard (3)	50	602	12.04	43	486 (471.42)	11.30232	-14.000	-19.269	-6.127
5	Ridge guard (7)	142	2540	17.8873	150	2667 (2480.31)	17.78	5.634	5.000	-0.600
6	Bitter guard (2)	99	945	9.5454	98	550 (539.00)	5.61224	-1.010	-41.799	-41.205
7	Bottle guard (15)	72	1306	18.1388	79	1416 (1203.60)	17.92405	9.722	8.423	-1.184
8	Sweet guard (5)	84	1684	20.0476	78	1583 (1503.85)	20.29487	-7.143	-5.998	1.233
9	Ash guard (15)	75	1280	17.0666	67	1089 (925.65)	16.25373	-10.667	-14.922	-4.763
10	Snake guard	7	80	11.4285	10	118	11.8	42.857	47.500	3.251

	(10)					(106.20)				
11	*Colocasia* (10)	125	2094	16.752	130	2202 (1981.80)	16.93846	4.000	5.158	1.113
12	Elephant Foot Yam (20)	8	188	23.5	9	224 (179.20)	24.88888	12.500	19.149	5.910
13	Jal kachu (15)	52	990	19.0384	53	981 (833.85)	18.50943	1.923	-0.909	-2.778
14	Cucumber (10)	115	1381	12.0086	117	1495 (1345.50)	12.77777	1.739	8.255	6.405
15	Amaranthus (7)	210	3356	15.9809	211	3410 (3171.30)	16.16113	0.476	1.609	1.128
16	Barbati	22	248	11.2727	-	-	-			
17	Radish (3)	49	743	15.1632	48	707 (685.79)	14.72916	-2.041	-4.845	-2.862
18	Cow pea (2)	138	2334	16.913	168	2839 (2782.22)	16.8988	21.739	21.637	-0.084
19	Summer cabbage (5)	45	463	10.2888	32	389 (369.55)	12.15625	-28.889	-15.983	18.150
20	Summer cauliflower (7)	35	247	7.0571	33	301 (276.92)	9.12121	-5.714	21.862	29.249
21	Summer tomato (2)	5	67	13.4	3	44 (43.12)	14.66666	-40.000	-34.328	9.453
22	Chilli (green) (1)	25	244	9.76	54	497 (492.03)	9.2037	116.000	103.689	-5.700
23	Leafy vegetables (5)	21	205	9.7619	24	244 (242.25)	10.16666	14.286	19.024	4.146
24	Water melon (20)	115	3009	26.1652	330	8267 (57.86)	25.05152	186.957	174.742	-4.256
25	Others (12)	117	1557	13.3076	130	1825 (1606.00)	14.03846	11.111	17.213	5.492
	Total	**2158**	**33896**	**-**	**2519**	**40737 (29811.01)**	**-**	**16.728**	**20.182**	
Winter vegetables										
1	Cabbage (5)	345	9657	27.9913	338	9194 (8734.30)	27.20118	-2.029	-4.794	-2.823
2	Cauliflower (8)	320	7034	21.9812	406	10637 (9786.04)	26.1995	26.875	51.223	19.190
3	Brinjal (5)	245	3006	12.2693	228	5534 (5257.30)	24.27192	-6.939	84.098	97.826
4	Radish (3)	275	5563	20.229	283	5524 (5358.28)	19.51943	2.909	-0.701	-3.508
5	Tomato (2)	195	4797	24.6	186	5915 (5796.70)	31.80107	-4.615	23.306	29.273
6	Garden pea (40)	45	173	3.8444	64	261 (156.60)	4.07812	42.222	50.867	6.079
7	Cucumber (15)	91	774	8.5054	104	927 (787.95)	8.91346	14.286	19.767	4.798
8	Knol- khol (15)	24	275	11.4583	21	215 (182.75)	10.23809	-12.500	-21.818	-10.649
9	French bean (3)	59	222	3.7627	48	279 (270.63)	5.8145	-18.644	25.676	54.530
10	Carrot (5)	44	527	11.9772	56	616	11	27.273	16.888	-8.159

						(585.20)				
11	Capsicum (3)	10	78	7.8	12	94 (91.18)	7.83333	20.000	20.513	0.427
12	Brocoli (5)	6	40	6.6666	6	41 (38.95)	6.83333	0.000	2.500	2.501
13	Chilli (1)	185	1254	6.7783	170	1171 (159.20)	6.88823	-8.108	-6.619	1.622
14	Bottle guard (15)	165	3656	22.1575	127	2704 (2298.40)	21.29133	-23.030	-26.039	-3.909
15	Beet (5)	15	33	2.2	19	42 (39.90)	2.21052	26.667	27.273	0.478
16	Others (12)	159	2329	14.6477	111	1665 (1465.20)	15	-30.189	-28.510	2.405
	Total	**2183**	**39419**	**-**	**2179**	**44837 (35029.13)**	**-**	**-0.183**	**13.745**	
C	Potato (20)	618	10902	17.6408	632	11452 (9161.60)	18.12025	2.265	5.045	2.718
	Total	**618**	**10902**	**-**	**632**	**11452 (9161.60)**	**-**	**2.265**	**5.045**	
Fruits										
1	Mango (30)	878	4874	5.5512	806	4103 (2872.10)	5.09057	-8.200	-15.819	-8.298
2	Pine apple (30)	813	1669	2.0528	682	9944 (6960.80)	14.58064	-16.113	495.806	610.281
3	Orange (15)	222	1225	5.518	216	968 (822.80)	4.48148	-2.703	-20.980	-18.784
4	Jack fruit (50)	490	14121	28.8183	224	5436 (2718.00)	24.26785	-54.286	-61.504	-15.790
5	Banana (12)	1490	15123	10.1496	1136	11746 (10336.5)	10.35563	-23.758	-22.330	2.030
6	Litchi (10)	226	1198	5.3008	52	179 (161.10)	3.4423	-76.991	-85.058	-35.061
7	Lime/ lemon (20)	486	2477	5.0967	414	1995 (1596.00)	4.81884	-14.815	-19.459	-5.452
8	Papaya (15)	390	3887	9.9666	356	3596 (3056.60)	10.10112	-8.718	-7.486	1.350
9	Sapota (10)	19	151	7.9473	13	81 (72.90)	6.23076	-31.579	-46.358	-21.599
10	Mosomi (10)	154	232	1.5064	142	287 (258.30)	2.02113	-7.792	23.707	34.170
11	Guava (5)	140	723	5.1642	70	328 (311.60)	4.68571	-50.000	-54.633	-9.266
12	Others (20)	80	580	7.24	173	1505 (1204.00)	8.69942	116.250	159.483	20.158
	Total	**5388**	**56258**	**-**	**4284**	**40168 (29168.1)**	**-**	**-20.490**	**-28.600**	
Nuts										
1	Coconut (50)	654	1845	2.8211	399	997 (498.50)	2.49874	-38.991	-45.962	-11.427
2	Areca nut (35)	399	1243	3.1152	452	1546 (1004.90)	3.42035	13.283	24.377	9.796
3	Cashew nut (30)	217	163	0.7511	22	9 (6.30)	0.40909	-89.862	-94.479	-45.535
	Total	**1270**	**3251**	**-**	**873**	**2551 (1,509.7)**	**-**	**-31.260**	**-21.532**	
Spices										
1	Ginger (20)	151	1247	8.2582	143	1216	8.50349	-5.298	-2.486	2.970

						(972.80)				
2	Turmeric (20)	108	842	7.7962	101	615 (442.00)	6.089	-6.481	-26.960	-21.898
3	Chilli (2)	275	558	2.029	278	659 (645.82)	2.3705	1.091	18.100	16.831
4	Black pepper (0)	26	82	3.1538	20	58 (58.00)	2.9	-23.077	-29.268	-8.047
5	Onion (15)	55	443	8.0545	28	180 (153.00)	6.42857	-49.091	-59.368	-20.187
6	Betel- vine (0)	48	625	13.0208	53	721 (721.00)	13.60377	10.417	15.360	4.477
	Total	**673**	**3798**	**-**	**623**	**3448 (721.00)**	**14.60377**	**-7.429**	**-9.215**	

Table 8. Livestock and poultry population as per 20th Livestock Census- 2019.

Sl. No.	Livestock/ poultry	Population (Nos) 2019-20	Population (Nos) 2012-13	% change over last 8 years
1	Cattle (Cross bread)	13071	13391	-2.390
2	Cattle (ND)	53989	120057	-55.031
	Total cattle's	**67060**	**130788**	-48.726
3	Buffalo	87	411	-78.832
4	Goat	36822	80021	-53.985
5	Sheep	202	116	74.138
6	Pig (Improved)	14231	31972	-55.489
7	Pig (Desi)	7250	19595	-63.001
	Total pigs	**21481**	**51567**	-58.344
8	Fowl (Desi)	287816	231493	24.330
9	Fowl (Improved)	32029	45986	-30.351
	Total fowls	**319845**	**277479**	15.268
10	Duck (Desi)	57390	61293	-6.368
11	Duck (Improved)	4595	14108	-67.430
	Total ducks	**61985**	**75401**	-17.793
12	**Total poultry including other birds**	**384523**	**367967**	4.499

Table 9. Species wise livestock and poultry production and productivity during the year 2019-20.

Sl. No.	Livestock/ poultry	Production Milk (Ltr.)	Production Meat (Kg)	Production Eggs (Nos.)
1	Cattle (Cross bread)	5442169.38	-	-
2	Cattle (ND)	12276349.89	-	-
3	Buffalo	26276.03	-	-
4	Goat	2367558.88	-	-
5	Goat/ Sheep	-	220763.67	-
6	Pig	-	1672130.84	-
7	Poultry	-	25854.53	-
8	Broiler	-	3541358.56	-
9	Fowl (Desi)	-	-	14869431
10	Fowl (Improved)	-	-	13439282
11	Duck (Desi)	-	-	4518196
12	Duck (Improved)	-	-	2365958
	Total	**20112354.18**	**5460107.60**	**35192867**

Table 10. Area production and productivity of fishery sector in Khowai district, Tripura 2019-20. (Figure in parenthesis of considering dressing percentage as 70%)

Sl. No.	Compiled report for production of (Culture & Capture) during 2018- 19 and conducted in 2019-20.	
1	Total numbers of farmers	21573
2	Total culture fisheries water bodies area (ha)	2956.24
3	Total utilized culture fisheries area for fish and prawn production area (ha)	2878.73
4	Total fish and prawn production from all culture fisheries (MT)	8565.98
5	Productivity of culture fisheries resources (Kg/ ha/ year)	2976
6	Total capture fisheries area (ha)	700.72
7	Total fish and prawn production from capture fisheries area (MT)	59.025
8	Productivity of capture fisheries resources (Kg/ ha/ year)	84.23
9	Total water area utilized for fish seed production (ha)	27.03
10	Total fish seed production (lakhs)	300.35
11	Total water area from all sources (Culture and Capture) ha	3620
12	Total fish production from all sources (Culture and Capture) (MT)	8597.764
13	Total prawn production from all sources (Culture and Capture) (MT)	0.841
14	Total fish and prawn production from all sources (Culture and Capture) (MT)	8625.005 (6037.504)*

4. PROBLEMS FOR DEVELOPMENT OF AGRICULTURAL AND ALLIED SECTOR IN KHOWAI DISTRICT

Farmers face many problems, which have direct or indirect affect on agricultural activities of the district. The few among the most common constraints are listed below-

1. Shortage of good quality Seeds especially for Small and Marginal Farmers.
2. Problem of Irrigation – Wastage of Water on the One Hand and Scarcity of Water on the Other.
3. Lack of Post Harvest Management and Marketing Facilities – Storage, Transport and Cold Chain.
4. Imbalanced use of Fertilizer & Pesticides: Unbalanced fertilizer usage is one of the biggest reasons for stagnant yield and depleting soil fertility. Fertilizer usage continues to be skewed due to irrational subsidy structure that favours Nitrogenous fertilizers over others.
5. Small and fragmented land holdings: Increasing demographic pressure, disguised employment in agriculture and conversion of agricultural land for alternative uses, has drastically reduced the average land holding.
6. Dependence on rainfall and climate: Many farmers are heavily dependent on monsoon and increasing daily temperature has made agriculture more prone to extreme weather events.
7. Lack of easy credit to agriculture and dependence on money lenders.

8. Fragmented supply chains: Large gaps in storage, Cold chains, Limited connectivity, Absence of marketing infrastructure.
9. Hilly, difficult terrains, inaccessibility, communication and transportation remain one of the key constraints of the farming community (more than 70% area is hilly and forest covered).
10. Soil erosion (run-off).
11. Use of local cultivars and lack of quality seeds and planting materials especially upland farming situation.
12. Market infrastructure.
13. Lack of modern tools, equipments and farm machineries.
14. Poor socio-economic conditions of the farmers.
15. Lack of oil extraction unit, flour mill, processing industry and storage etc.
16. The instability in production may be attributed to various factors such as unpredictable natural calamity like uneven high intensity of rainfall, inconsistent use of modern technology, etc.
17. Lack of policy frame work for Channelization of production-processing marketing components.
18. Lack of commercialization and value addition.
19. Lack of scientific knowledge of cultivation of crops, livestock poultry and fish production system.
20. Non-availability of desired numbers of germplasm, breeding program and lack of implementation.
21. High Production cost due to high feed cost (concentrate) as feeds are imported from other states.
22. Inadequate vaccine availability and health care coverage.
23. Cost of livestock and poultry are low due to unorganized market.
24. Slow growth in internal production of fishes adversely affected fisheries development in the district.
25. Absence of proper marketing channels and insecurity in public ponds for fish culture are other root causes of non adoption of the technology by farmers largely and low productivity of fishery in the district.
26. Inadequate documentation of plant resources viz. timber and non-timber forest produces (Medicinal, food, fodder and fuel etc).

5. PROSPECTS FOR DEVELOPMENT OF AGRICULTURAL AND ALLIED SECTOR IN KHOWAI DISTRICT

1. **Development initiatives** including infrastructure, technological interventions, farmer friendly policies and institutional mechanisms can increase the agricultural growth and farmer's income.
2. **Technology** can help to reduce 'yield gaps' and thus improve productivity.
3. The **water-use efficiency** can be improved significantly with better use of technologies that include drip irrigation.
4. **Cooperative Farming:** In this context, consolidation of land holdings also becomes important to raise farmer incomes. Farmers can voluntarily come together and pool land to gain the benefits of size. Through consolidation, farmers can reap the economies of scale both in input procurement and output marketing.
5. There is a need to make a **shift from rice-centric policies to millet, pulses, fruits, vegetables, livestock and fish.**
6. The creation of a **competitive, stable and unified national market** is needed for farmers to get better prices.
7. Construction of irrigation channel in lowland areas for supply water in paddy field and water harvesting structures may help to make water available during the lean period.
8. Increasing incomes through the development of more sustainable farming system and the establishment of Off-Farm enterprises.
9. 3. Making people more aware of the need to preserve and regenerate natural resources.
10. 4. Establishing effective and appropriate delivery systems for input and for the maintenance of assets and resources.
11. Enhancing savings capacity and establish the habit of thrift.
12. Increasing access to basic services and infrastructure facilities.
13. Building on the natural advantages of the area through greater emphasis on forestry and agro forestry as sources of livelihood as well as environmental protection.
14. Adopting the low input technology and on high value/low volume, non perishable crops offering windows of opportunity for marketing outside the region (*e.g.* tea, timber, forest products, arecanut, essential oil) or products for the local market (e.g. livestock products and fisheries).
15. Effective crop rotation particularly with leguminous crops and crop diversification with proper application of soil nutrients can help towards sustainability in crop production.
16. High yielding and improved varieties suitable to the specific altitudinal zones along with optimum nutrients increase crop production.
17. Opportunity for extensive organic farming under upland ecosystem.
18. Mechanization of hill agriculture for increasing production and reducing drudgery.
19. Rain water conservation and Management.
20. Agro-forestry intervention particularly in classified waste lands and permanent fallow.

21. Tremendous opportunities for horticulture sector development including apiculture and floriculture.
22. Post harvest processing, value addition and export/domestic market tapping.
23. ITKs for validation and utilization.
24. Opportunity for giving a meat revolution to the country.
25. Opportunities to attract the youths through industrial approach to agri-horti-animal fish sector.

6. DEMAND AND SUPPLY OF FOOD GRAINS IN KHOWAI DISTRICT BY 2030

The projection of population in the Khowai district of Tripura was estimated by assuming 1.257 rate of decline in growth rate every year with base year 2011 Census population of 3,66,223 for the next ten years upto 2030 (Table 11). The projection study on production and requirement of food grains in the coming decades in Khowai district of Tripura was carried out to estimate the demand-supply gap of food grains as well as fruits, vegetables and livestock and fishery in the district by 2030 (Table 11 to 14).

The growth rate of food grains production (includes cereals, oilseeds, pulses and other crops) are estimated by using time series data for a period of 2013-14 to 2019-20 Handbook of area, production and yield of principal crops in Tripura 2020, Directorate of Economics and Statistics, Government of Tripura).

The growth rate of vegetables, fruits, plantation and spices crops are estimated by using time series data for a period of 2014-15 to 2019-20 Handbook of area, production and yield of horticultural crops in Tripura 2020, Directorate of Economics and Statistics, Government of Tripura).

Similarly, the growth of livestock and fishery growth rate was based on the 20th Livestock Census 2012-13 and 2019-20 (Directorate of Animal Husbandry & Veterinary, Govt. of Tripura).

Requirement of food grains along with fruits, vegetables, livestock and fishery was estimated by multiplying the recommended amount of per capita food grains with the population base at that point of time (say, 2021, 2022 etc.) in Table 11 and 13. The data in Table 11 data shows that the population of the district estimated to be 4,61,304 by 2030 from 4,12,257 during 2021. The production of cereals, pulses, oilseeds, fruits, vegetables, meat, milk, egg and fish was also estimated at increase in decreasing rate every year. The demand for food grains as well as livestock products and fish was estimated to feed the growing population by 2030. The data in Table 11 to 12 shows that the demand was more than supply except the fruits, vegetables and fish in the district from 2021 to 2030.

The food grains cereals shows at balance by 2030 (surplus + 324.119 tones) but pulses and oilseeds decrease to a tune of deficit -9291.078 and -3013.213 tones. To make this district food and oilseeds, pulse secure, production should be increased as it was found that all the years were deficient in pulses and oilseeds production. The every year 15% targeted production incorporated especially pulses and oilseeds due to introduction of new crops, HYVs, new technology, area expansion, free supply of critical inputs through NFSM & NMOOP extension functionaries giving more emphasis for promotion of pulse and oilseeds crops with double/ mixed/ intercropping system for food & nutritional security.

The production of fruits in the district was estimated to surplus of 12330.504 tones which indicate the scope for export and other processing for value added products to meet the other food grains requirements for the population in the district. Annual growth constant during estimation of fruit production due to rejuvenation of yearly fruit orchard, less plantation and less management.

However, the vegetable demand is almost equal to supply in all the years upto 2030 only 1% annual growth incorporated to feed the people by 2030.

The data on Table 14 shows that the demand for milk, meat, egg and fishes was estimated to be more than supply by 2030 except the fish where surplus of 137.552 tones was estimated to be surplus in the district which might be due every household rearing the fish at village level nature of tribal and Bengali people of the district.

Table 11. Demand/ requirement estimates based on growth trends of last two decades population (Annual growth rate 1.257) in Khowai district Tripura.

YEAR	POPOLATION	CEREALS	PULSES	OILS/ FATS	VEGETABLES	FRUITS
2021	412257	53700.566	11483.306	4078.728	43021.461	15047.381
2022	417439	54375.589	11627.652	4129.998	43562.234	15236.524
2023	422687	55059.198	11773.834	4181.920	44109.894	15428.076
2024	428000	55751.371	11921.845	4234.486	44664.379	15622.000
2025	433380	56452.153	12071.701	4287.714	45225.810	15818.370
2026	438827	57161.687	12223.426	4341.605	45794.237	16017.186
2027	444342	57880.091	12377.049	4396.168	46369.768	16218.483
2028	449928	58607.676	12532.637	4451.434	46952.685	16422.372
2029	455577	59343.310	12689.958	4507.317	47542.158	16628.561
2030	461304	60089.274	12849.475	4563.978	48139.783	16837.596

Table 12. Supply/ production of food grain estimates of agricultural commodities based on agricultural census (2019-20) in Khowai district Tripura.

YEAR	CEREALS (1.8%)	PULSES (15%)	OILS/ FATS (15%)	VEGETABLES (1%)	FRUITS (constant)
2021	51990.870	1514.210	659.900	44190.730	29168.10
2022	52926.705	1741.342	758.885	44632.637	29168.10
2023	53862.541	1968.473	857.870	45074.544	29168.10
2024	54798.377	2195.605	956.855	45516.451	29168.10
2025	55734.213	2422.737	1055.840	45958.358	29168.10
2026	56670.049	2649.869	1154.825	46400.265	29168.10
2027	57605.885	2877.001	1253.810	47841.172	29168.10
2028	58541.721	3104.133	1352.795	47283.079	29168.10
2029	59477.557	3331.265	1451.780	47724.986	29168.10
2030	60413.393	3558.397	1550.765	48166.893	29168.10
	61349.229	3785.529	1649.750	48609.803	29168.10

Table 13. Demand/ requirement estimates based on growth trends of last two decades population (Annual growth rate 1.257) in Khowai district Tripura.

YEAR	POPOLATION	MILK	EGG	MEAT	FISH
2021	412257	47788.532	6637284.000	11438.253	6729.469
2022	417439	48389.224	6720714.000	11582.030	6814.057
2023	422687	48997.569	6805206.000	11727.638	6899.723
2024	428000	49613.396	6890760.000	11875.076	6986.465
2025	433380	50237.046	6977376.000	12024.345	7074.284
2026	438827	50868.458	7065072.000	12175.474	7163.198
2027	444342	51507.742	7153866.000	12328.496	7253.225
2028	449928	52155.287	7243794.000	12483.472	7344.402
2029	455577	52810.156	7334730.000	12640.185	7436.601
2030	461304	53474.053	7426926.000	12799.069	7530.078

Table 14. Supply/ production estimates of milk, meat, eggs and fish commodities based on census (2019-20) in Khowai district Tripura.

YEAR	POPOLATION	MILK (10%)	EGG (constant)	MEAT (10%)	FISH (3%)
2021	412257	13056.680	21782259	3875.580	6037.504
2022	417439	14362.348	21782259	4263.138	6218.629
2023	422687	15668.016	21782259	4650.696	6399.754
2024	428000	16973.684	21782259	5038.254	6580.879
2025	433380	18279.352	21782259	5425.812	6762.004
2026	438827	19585.020	21782259	5813.370	6943.129
2027	444342	20890.688	21782259	6200.928	7124.254
2028	449928	22196.356	21782259	6588.486	7305.379
2029	455577	23502.024	21782259	6976.044	7486.504
2030	461304	24807.692	21782259	7363.602	7667.630

7. STRATEGIES SUGGESTED FOR IMPROVEMENT:

General Strategies:

Following recommendations can be submitted to the policy makers at Tripura. Further refinement of the same led to the following policy recommendations:

Market Led and Value Chain Extension :

Emphasis needs to be shifted from rice and monocropping to economically remunerative crops like jackfruit, litchi, wood apple and pineapple in suitable areas and Recognition of Forest Rights (RoFR) lands, establish post- harvest processing plants in collaboration with the Ministry of Food Processing Industry and Ministry of Commerce, Agricultural and Processed Food Products Export Development Authority (APEDA), and create state organic brands for selling in the national as well as international markets. In the fishery sector, very good market exists in the state for fishes like Pabda and Hilsa and fresh water prawn and so, developing scientific methods of cultivating them in the state needs organized research and development efforts. 2. Floriculture potential of the district is high, for high value flowers like Anthurium, Gerbera, Dendrobium orchids for which exploring markets in Kolkata, Delhi and Bangladesh requires to be initiated. As the sector is still unorganized, special emphasis is required on this aspect. 3. Processing facilities in fishery sector is required, keeping in mind the high demand for fresh, fermented and processed fish in the whole North Eastern Region. 4. Trade negotiations with the Bangladesh Government, through the Ministry of External Affairs (MoEA), needs to be initiated to increase bi-lateral ties as well take advantage of the existing market potential and the expanding railways in the state.

Skill and Capacity Development

Farmers of Khowai district needs more knowledge on low cost poly house cultivation of vegetables, post harvest, processing and value addition in horticulture produce, drip irrigation, promoting integrated farming systems (Piggery, Fisheries, Poultry), introducing new and high yielding breeds in poultry and live stock sector, farm mechanization, small scale enterprises, agricultural policy awareness, and cultural competency, exposure visits for advanced technological awareness) and functional (communication skills, analytical skills, systematic understanding and professional competence) skill development of farmers in collaboration with T-SAMETI, ICAR institutions and KVK. While ICAR, CAU, Agricultural College and KVK can engage in technical skill enhancement, T-SAMETI can develop capacity of extension professionals in functional skills.

Group Based Activities and Entrepreneurship Development:

Tapping into the huge economic potential of high value crops in the district, organizing farmers into Farmer Producer Organizations (FPOs) in collaboration with NABARD will transform farming to a commercial business and increase their income manifolds. 2. Agripreneurship and agricultural start-ups needs to be encouraged by the Govt. and as T-SAMETI is already recognized as a Nodal Training Institute under Agri Clinics & Agri-Business Centre's (AC&ABC) Scheme of Government of India implemented by MANAGE, it can take an active role in mobilizing the people, especially the youth. 3. The scope of entrepreneurship in livestock (poultry, piggery, goatery and dairy) sector is huge and untapped in the district and requires more directed efforts. 4. Increased involvement of SHGs, especially women SHGs and encouraging backyard poultry/piggery will help in increasing household income and give rural women a steady income source. 5. Development of Dairy Cooperative Societies for better leveraging of the demand of milk and milk products in the state. 6. Large scale farms (by consolidation of fragmented land holdings) at community level are needed to be established to provide employment to the rural youth and increase production from the sector.

Strategies such as short, medium and long term development of Livestock Sector:

Short term:

a. AI in pig and goats needs to be started with immediate effect.
b. Shortage of straw of cattle semen and liquid nitrogen needs to be solved.
c. Fodder cultivation along with production of ingredients of livestock feed need to be encouraged with utmost follow up.
d. Door Step AI workers need to be brought under state livestock policy framework.
e. Feed mills to be established with capacity to supply the required amount.
f. Registered farm with specific germplasm needs to be developed to supply quality livestock and poultry stocks to start a scientific farm by newly trained people.

Medium:

a. Feed mills to be established with alternate source of ingredients like tuber crops.
b. IT Enabled farm registration and monitoring system needs to be started.
c. Laboratory diagnosis facility needs to be proper at least block level.
d. Animal Health and Vaccination card should be mandatory for all registered farmers.

Long term:

a. Vocational training on animal husbandry need to be introduced in all schools.
b. Entrepreneurship skill in this sector needs to be encouraged in schools and colleges.
c. Biology labs in schools and colleges need to orient in economic and diagnostic activities of veterinary science.
d. One Health Progamme needs to popularize among veterinarians and Para vets.

e. Feed go down and fodder seed and sapling bank need to be properly maintained.
f. All schemes and projects of Department of Animal husbandry and dairying, of Central government need to be implemented.

Strategies for development of Fishery Sector :

Although Khowai district has already achieved self sufficiency in both seed production as well as in Table fish production, still there is scope for further improvement. Following strategies can be recommended for overall development of this sector:

a) More focus should be given on quality seed production.
b) Fresh water Prawn Farming can be encouraged.
c) Diversification of Aqua culture through High Value Fish Species is suggested
d) More focus to be given on Conservation of Indigenous fish species in natural water bodies.
e) Feed based intensive fish culture needs to be promoted.
f) Use of Aerator in fish pond needs to be promoted.
g) Integrated Fish Farming needs to be promoted in Mission mode.
h) Advanced yearling based carp culture should be encouraged.

Forestry of Khowai district:

Forestry in Khowai district covers an area of 54319 ha accounting for 41% of the total geographical area (1328 sq km) of the district. About 70% areas are hilly and forest and river course covered (A/c to district Survey Report, Khowai district Tripura, 2019). Average altitude is 23 meters endowed with diverse vegetation of rich flora and fauna. Khowai district presents picturesque scene with lusty rich green forest which provides a natural habitat to different species for flora and fauna. Some of the forest of Khowai district known as, Banabithi Park, Jangal Mahal Park, Chakama Ghat Park, Baramura eco- Park Forest are rich in timber.

Table 15. Technology intervention for Forest sector in Khowai district

Sl. No.	Problem	Intervention
1	Jhum cultivation causing loss in forest	Awareness programme Scheme for aforestation programme for trees and NTFPs in the Jhum Agro-forestry programme
2	Inadequate documentation of plant resources viz. timber and non-timber forest produce (Medicinal, food, fodder and fuel etc)	Identification, documentation of plant resources Propagation of such plants of economic importance in nurseries and demonstration plots to inculcate local stakeholders

Strategies:

- Land use policy documents its implementation for better land management.
- Community participation approach in forest management thereby conserving through traditional law
- Agro-forestry practices
- Optimum combination of tree species and agricultural crops
- Identification and documentation of plant resources for economic importance
- Planting stock improvement of some indigenous tree species.

Suggestion and Recommendations:

- Massive afforestation programmes should be implemented without delay.
- Practice of Jhum cultivation to be reduced.
- Illegal felling of trees to be banned.
- Encourage, involve Community participation in tree plantation programmes.
- Encourage application of traditional manure practices in crop fields to maintain sustained soil fertility.
- Create mass awareness, dissemination of information on climate change and its consequences to the stakeholders.

8. ADOPTION OF CLUSTER APPROACH FOR HOLISTIC DEVELOPMENT

- Promotion of organic cultivation of viz. potato, ginger, turmeric and other seasonal vegetable crops.
- Promoting the cultivation of off season vegetables.
- Promotion of major area specific field crop production (oilseeds and pulses).
- Promotion of seed production of major crops.
- Fallow land development under agro-forestry in the district.
- Promotion of improved breeds of goat, pig and poultry.

9. TECHNOLOGIES OPTIONS SUITABLE FOR HOLISTIC DEVELOPMENT OF AGRICULTURE AND ALLIED SECTORS IN KHOWAI DISTRICT TRIPURA

Table 16.

Sl. No.	Title of Technology	Details of technology
1	Weed control in bitter gourd through Paddy straw mulching	Use straw mulch in bitter gourd is done mainly to conserve residual soil moisture. Through the experiment it is observed that Water use efficiency is 85%. It is also observed that the flowering stage initiated by 20 days earlier in comparison with control. More vegetative growth is also recorded in case of straw mulching. B:C ratio in case of straw mulching it is 1:2.65 So, we can recommend the farmer to go for straw mulching as for them the previous crop of bitter gourd is rice, So they can use this straw for mulching purpose @ 5 t straw mulch/ha.
2	Cultivation of ginger through Raising Seedling	Treat the selected rhizome with mancozeb (0.3%) and quinalphos (0.075%) for 30 min. At the commencement of season, cut the single buds with small piece of rhizomes weighing 4- 6 g. Treat the single bud sprouts (mancozeb 0.3%, 3 g/L of water for 30 min) before planting fill the pro-trays with nursery (Sand, Soil, Vermicompost @1:1:1) and *Trichoderma* 10g/ kg Plant the ginger bud sprouts in pro-trays seedlings will be ready within 30-35 days for transplanting.
3	Root dipping in SSP-mc Slurry method of P management in transplanted rice growing areas of Khowai district	Step-I:Root dipping of paddy seedling in soil-water slurry amended with SSP Step II: Root dipping of paddy seedling in soil water slurry amended with MC Step III: Broadcasting of RP @ 125kg/ha along with 50% Recommended dose of N &K in the main field.
4	Soil acidity amelioration practices in groundnut	Furrow application of lime on the basis of lime requirement calculated as per the pH (10 % of actual LR will be followed)+ FYM 5 t/ha + RD of NPK.
5	Application of Lime in improving the yield of Maize	100% NPK+ Furrow application of on the basis of lime requirement calculated as per the pH (10 % of actual LR will be followed)+ + FYM @ 5 t/ha.
6	Integrated Nutrient management of Lentil	75% NPK + 25t FYM + seed inoculation through Rhizobium + soil application of 3 kg PSB ha^{-1} .
7	Application of beneficial microbes in improving paddy yield	Application of Azosprillium@ 6.25 kg/ha+PSB@6.25 kg/ha
8	Rice-pulse/Oil Seeds	T1:Rice (var. Gomoti)- Toria (var. TS-67), T2:Rice (var.

	cropping system for doubling farmers income	Gomoti)- Field Pea (TRCP-8), T3:Rice (Gomoti) -Lentil (HUL-57)
9	Weed Management in Brinjal	Pendimethalin (@ 1.5 lit/ha): 3-5 Days after transplanting (DAT)+ Hand weeding (HW) 30 Days after transplanting (DAT)
10	IPM against brinjal fruit & shoot borer	Mechanical control + Behavioral control (Pheromone trap 25 nos. /ha) + Botanicals (Nimbicidine 3 ml/lt) + Chemical control (Cartaphydrochloride 1ml/lt). (Mechanical control: Clipping of drooped shoots and removal of infested fruits from the field at weekly interval, b) Behavioral control: Installation of pheromone traps @ 75 per hectare, starting from flower bud initiation (45 days old crop) till final harvest and changing the lures at monthly intervals, c) Botanical: Application of nimbecidine 0.03% @ 3-5 ml/lit, d) Chemical control: Cartap Hydrochloride 50SP @ 500-550 g/ha)
11	Management of fruit fly in bittergourd	Pheromone traps @ 25 traps/ha+ Gur based poison bait trap: 50 ml Malathion + 200 g Gur + 2 litre water.
12	Food bait: a promising tool to manage melon fly, *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae)	Prepare bait using rotten banana make as 1 kg banana mashed up with 10 g carbofuran, 5 g yeast and 5 g citric acid. Keep the poison baits in plastic plate and cover with another inverted plastic plate maintaining 5 cm gap between the rims of two plate. The traps should be kept suspended with the help of bamboo stick. Applications are to be made at weekly intervals, commencing from 30 days after planting up to the end of the commercial fruit production. In all, 10-12 application of baits may be required per cropping season.
13	Storage pest management in paddy	T1=Dol painted with burnt mobil T2=Gunny bag sprayed with Neem oil @10ml/lt water
14	Rat control through IPM	Trapping with local made bamboo trap at tillering stage of crop @32traps/ha+Zinc Phosphide poison baiting (2%) @ 10 g per burrow at tillering to PI stage of the crop
15	Biopesticides against chilli leaf curl	T1: Application of Nanma @1% (A bio pesticide formulated from Cassava leaf & other ingredients) T2:Application of Neem oil 0.15 EC @ 0.3% T3: Application of Sonata @ 0.1% T4: Alternate spray of T1, T2 and T3
16	Management of fungal wilt in chilli	i) Seed treatment with TV (1g/10gm of seed) ii) Seedling treatment with TV (1 kg in 2 litres of water for 1000 seedlings) iii) Soil application with TV (1 kg in 20 kg of well rotten FYM) iv) Regular spray of TV at 15 days interval @ 10g/litre.

17	Bagging in banana to avoid the effect of scaring beetle	White polythene, of 40 µm 100 x 60cm size white polythene without perforation, and the lower part of the polythene remain open. (40 µm 100 x 60cm size).
18	Preparation of Jackfruit Ready to cook	Select young green jack-fruit. Remove the skin, take out the fruit pieces and cut into uniform pieces (1.2 to 1.8 cm thick). Place the slices in a large (non-metallic) container with brine (8% salts solution and 0.2% KMS in weigh fruit pieces. It has been observed that in these solutions pieces of tender jackfruits remain as fresh up to 8-12 months.
19	Duck cum fish farming	300 nos. duck/ha, Initial stocking 12000 nos./ha Periodical stocking 8000 nos/ha
20	Household pig cum fish farming	Initial stocking of fish seed 10000 nos./ ha and periodical stocking 8000 nos. /ha, 30 nos. pig/ha
21	Improvement of ruminant and non-ruminant productivity by strategic supplementation of nutrients and feed technology	T1: Supplementation of legume fodder to the level of 15% in green grasses T2: Chopped paddy straw and concentrate based complete mash ration feeding
22	Composite Fish Culture	Pond Preparation, Filling with water. Liming and manuring: Application of 625 kg of lime/year/ ha water body. Application of Raw Cowdung @ 31250 kg/year. Application of Fertilizer: Urea 450 kg/year, SSP 750 kg/year, MOP 75 kg / Year. Stocking of Advance fingerlings @ 12500 Nos. Supplementary feeding: Mustard oil cake @ 2500 kg/year, Rice Bran 2500 kg/Year, Dry Fish @312.5 kg.
23	Low cost feeding rack for goats	Two numbers of wooden portable frames were made where one frame can be inserted through another one. Length and width of the frame is 6ft x 3 ft for four numbers of goats. Fodders are placed in between the two frames and the goats can easily and happily consume the fodder after lift the front leg on the frame.
24	Application of red spectrum of light to improve egg production	Fixing of red coloured zero watt electric bulb at the layer shed during night time just after starting of laying was done
25	Portable Mini Poultry Brooder	Brooder is an equipment used to provide warmth to day-old chicken of broiler, layer, turkey, guinea fowl , Japanese quail chicks, etc upto 2 weeks in summer and 3 weeks in winter. Portable mini poultry brooder consists of a heat source (incandescent bulb) with height adjustment to increase / decrease the temperature based on the behaviour of the chicks. Brooder

		guard is made of up of polypropylene lute board sheets which can withstand the brooding temperature. It is washable and can be disinfected and reused. The brooder guard height is 1ft and 3 ft diameter. It can accommodate 100 chicks. It is portable.
26	Piglet Soothe Snooze Deck	The piglets soothe snooze deck is 3 feet length, 2 feet width and 2 feet height. It is fabricated using plain sheet on three sides and with wooden door in the front. A lamp is mounted on the top to provide light and warmth to the piglets during night and winter. The floor is made up of two layers viz. Gunny begs and straw for providing warmth and ease of the deck can be fixed at convenient location near the farrowing pen. The holding capacity is 12 – 15 piglets and cost of installation may be around Rs. 2000/- 3,000/-

10. WHO WILL DO WHAT?

A dedicated extension mechanism needs to be developing for the district, parallel to the existing system in convergence mode with each sector, engaging community extension/ para-extension professionals for higher effectiveness. Increased focus on extension research needed, as it is non-existent in the state as well as in the district level.

KVKs and ICAR can take strong initiatives in partnering with suitable stakeholders and take up projects in the state for an in- depth analysis and come up with pertinent recommendations. 3. Recruitments under Agricultural Technology Management Agency (ATMA) can be taken up by NGOs in partnership with the State Government under the convergence fund to avoid issues related to permanent employment or salary. T-SAMETI can play an active role in brokering strong linkages among the major stakeholders in the state, increase partnership with NABARD for increasing financial and credit linkage, increase interaction with ICAR to get easy access to recent technological developments, partner with Panchayati Raj Institutions (PRIs) at the grassroots level for efficient delivery of extension services, encouraging entry of private sector (with required rules and regulations to protect farmers' rights), convergence of schemes like MGNREGA, The following works need to be done by the agencies mentioned-

a. **Infrastructure and logistics**: NABARD, State Government
b. **Human Resource Development**: KVK, College of Agriculture, College of Fishery Veterinary college, ICAR
c. **De-worming and vaccination**: ARDD, cooperatives, Farmer's clubs
d. **Organizing farmers**: KVK, Department of Agriculture & Farmers Welfare ,Department of Horticulture & Soil Conservation, Department of Fisheries and ARDD, Cooperatives, NABARD, T-Sameti, TRLM

e. **Input and Output**: Marketing department, Cooperatives, KVK, Department of Agriculture & Farmers Welfare , Department of Horticulture & Soil Conservation ,Department of Fisheries and ARDD

f. **Quality control**: Department of Agriculture & Farmers Welfare , Department of Horticulture & Soil Conservation ,Department of Fisheries ARDD

g. **Planning:** ICAR,KVK, Department of Agriculture & Farmers Welfare , Department of Horticulture & Soil Conservation ,Department of Fisheries, and ARDD

h. **Animal Welfare**: ARDD, KVK and NGOs

i. **Wild Life and Human Conflict management:** Forest Department, ARDD and KVK

j. **Research, teaching and extension all together**: College of Agriculture, College of Fishery Veterinary college

k. **Enhancing economic activities in animal husbandry sector for youths and farmers**: KVK, ARDD, Forest department, Veterinary College.

l. **Disease forecasting**: GKMS/IMD/ICAR

m. **Credit linking and insurance**: BANKs, NABARD, MSME, Khadi and Village industries, cooperative.

n. **Value addition and marketing:** Cooperative, KVK, ARDD, Department of Agriculture & Farmers Welfare , Department of Horticulture & Soil Conservation , Department of Fisheries TRLM

11. POLICY INTERVENTIONS REQUIRED FROM GOVERNMENT IN KHOWAI DISTRICT OF TRIPURA

Regulatory reforms needed in existing Acts especially pertaining to land, water, seed, chemicals and fertilizer, markets etc as per national priority fixed by Central Government. Effective coordination and convergence mechanism among various schemes, programmes and activities run by different department is needed for achieving desired outcomes in faster pace. Following activities need to be implemented in priority basis:-

- Credit linkage with individual farmer/rural youth/women, SHGs, Farmer's Club and cooperatives need to be optimum
- Fasal Bhima Yojana need to be implemented in large scale
- Pradhan Mantri Krishi Sinchai Yojana programmes need to be implemented efficiently.
- More manpower and logistics should be added in Animal Resources Development Department.
- Activities of National Institutes/Organization should be linked with all the departments/institutes of the district.
- Minimum Support Price of the major crops needs to be finalized well in advance and notification/awareness needs to be made efficiently.

- Indigenous Technology Knowledge need to be validated documented and promoted.
- Geological Indicators need to be identified; Protection of Plant Varieties and Farmer's Rights need to be protected.
- Local animals and birds need to be identified as breed after proper management.
- Disaster Management programmes need to be efficient

12. CONCLUSION:

To achieve the target production of Food Grains, milk, egg, meat and to generate sufficient employment State govt. has sought some strategies. However sufficient cooperation, collaboration and coordination need to be made among all the line departments and stakeholders to achieve the desired goal. Farmers of each village should have at least one farmer's club covering all the wards and they should monitor input procurement and sale of produce by the farmers so that maximum benefit is received. All the markets need to be linked with eNAM and may be converted to regulated market. The entire food requirement for a particular village may be planned to produce in the village itself by linking with government schemes. Gram Sabha and Gram Sansad should chalk all the plans considering realistic situations to achieve the target. Panchayat Raj Institutions should have appropriate connection with development departments and real producers. All the desired goals may be attained if grass root level villagers know and implement the appropriate action as finalized in consultation with government departments/institutes and other agencies. Improving small farm production and productivity as a major development strategy can make significant contribution towards elimination of hunger and poverty. Starting from doubling farmer's income by 2022 to become self sufficiency in food production in 2030, efficient plan and execution are required in collaborative, cooperative and coordinated manner among the all stakeholders.

ANNEXURE

Table 17. Balanced diet for infants, children and adults per day (moderate works).

Food groups	g/ portion	Adult (no of portions)		Infants & Children's	Infants & Children's (No. of portions)			
		Man	Woman	g/ portion	Infants 6- 12 months	1- 3 years	4- 6 years	Average children's
Cereals & millets	30	15	11	30	0.5	2	4	2.166
Pulses	30	3	2.5	30	0.25	1	1	0.75
Fat/ oil	5 ml	6	5	5	4	5	5	4.66
Vegetables	300	1.66	1.66	300	0.333	0.5	0.8333	0.555
Fruits	100	1	1	100	1	1	1	1
Milk	100 ml	3	3	100	4	5	5	4.666
Eggs	180	1	1	-	-	-	-	-
Meat	85	1	1	-	-	-	-	-
Fish	50	1	1	-	-	-	-	-

Table 18. Estimation of food grains and oils consumption (MT/ capita/ year) as per dietary guidelines suggested by ICMR, Hyderabad.

YEAR	SEX	POPOLATION	CEREALS	PULSES	OILSEEDS
2021	M	188443	30951.763	6190.353	2063.451
	F	180295	21716.533	4935.576	1645.192
	C	43519	1032.271	357.378	370.086
	T	412257	53700.566	11483.306	4078.728
2022	M	190812	31340.871	6268.174	2089.391
	F	182561	21989.472	4997.607	1665.869
	C	44066	1045.246	361.870	374.737
	T	417439	54375.589	11627.652	4129.998
2023	M	193211	31734.907	6346.981	2115.660
	F	184856	22265.905	5060.433	1686.811
	C	44620	1058.386	366.419	379.448
	T	422687	55059.198	11773.834	4181.920
2024	M	195640	32133.870	6426.774	2142.258
	F	187180	22545.831	5124.053	1708.018
	C	45180	1071.670	371.018	384.211
	T	428000	55751.371	11921.845	4234.486
2025	M	198099	32537.761	6507.552	2169.184
	F	189533	22829.250	5188.466	1729.489
	C	45748	1085.143	375.683	389.041
	T	433380	56452.153	12071.701	4287.714
2026	M	200589	32946.743	6589.349	2196.450
	F	191915	23116.162	5253.673	1751.224
	C	46323	1098.782	380.404	393.931
	T	438827	57161.687	12223.426	4341.605
2027	M	203110	33360.818	6672.164	2224.055
	F	194327	23406.687	5319.702	1773.234
	C	46905	1112.587	385.184	398.880
	T	444342	57880.091	12377.049	4396.168
2028	M	205663	33780.148	6756.030	2252.010
	F	196770	23700.947	5386.579	1795.526
	C	47495	1126.581	390.029	403.897
	T	449928	58607.676	12532.637	4451.434
2029	M	208242	34203.749	6840.750	2280.250
	F	199243	23998.819	5454.277	1818.092
	C	48092	1140.742	394.932	408.974
	T	455577	59343.310	12689.958	4507.317
2030	M	210860	34633.755	6926.751	2308.917
	F	201747	24300.426	5522.824	1840.941
	C	48697	1155.093	399.900	414.119
	T	461304	60089.274	12849.475	4563.978

*data calculated based on ICMR guidelines

Table 19. Estimation of vegetables and fruits consumption (MT/ capita/ year) as per dietary guidelines suggested by ICMR, Hyderabad.

YEAR	SEX	POPOLATION	VEGETABLES	FRUITS
2021	M	188443	20634.509	6878.170
	F	180295	19742.303	6580.768
	C	43519	2644.650	1588.444
	T	412257	43021.461	15047.381
2022	M	190812	20893.914	6964.638
	F	182561	19990.430	6663.477
	C	44066	2677.891	1608.409
	T	417439	43562.234	15236.524
2023	M	193211	21156.605	7052.202
	F	184856	20241.732	6747.244
	C	44620	2711.557	1628.630
	T	422687	44109.894	15428.076
2024	M	195640	21422.580	7140.860
	F	187180	20496.210	6832.070
	C	45180	2745.589	1649.070
	T	428000	44664.379	15622.000
2025	M	198099	21691.841	7230.614
	F	189533	20753.864	6917.955
	C	45748	2780.106	1669.802
	T	433380	45225.810	15818.370
2026	M	200589	21964.496	7321.499
	F	191915	21014.693	7004.898
	C	46323	2815.049	1690.790
	T	438827	45794.237	16017.186
2027	M	203110	22240.545	7413.515
	F	194327	21278.807	7092.936
	C	46905	2850.417	1712.033
	T	444342	46369.768	16218.483
2028	M	205663	22520.099	7506.700
	F	196770	21546.315	7182.105
	C	47495	2886.271	1733.568
	T	449928	46952.685	16422.372
2029	M	208242	22802.499	7600.833
	F	199243	21817.109	7272.370
	C	48092	2922.551	1755.358
	T	455577	47542.158	16628.561
2030	M	210860	23089.170	7696.390
	F	201747	22091.297	7363.766
	C	48697	2959.317	1777.441
	T	461304	48139.783	16837.596

*data calculated based on ICMR guidelines

Table 20. Estimation of milk, eggs, meat and fish consumption (MT/ capita/ year) as per dietary guidelines suggested by ICMR, Hyderabad.

YEAR	SEX	POPOLATION	MILK	EGG	MEAT	FISH
2021	M	188443	20634.509	3391974.000	5845.502	3439.085
	F	180295	19742.303	3245310.000	5592.751	3290.384
	C	43519	7411.721	0.000	0.000	0.000
	T	412257	47788.532	6637284.000	11438.253	6729.469
2022	M	190812	20893.914	3434616.000	5918.988	3482.319
	F	182561	19990.430	3286098.000	5663.042	3331.738
	C	44066	7504.880	0.000	0.000	0.000
	T	417439	48389.224	6720714.000	11582.030	6814.057
2023	M	193211	21156.605	3477798.000	5993.405	3526.101
	F	184856	20241.732	3327408.000	5734.233	3373.622
	C	44620	7599.232	0.000	0.000	0.000
	T	422687	48997.569	6805206.000	11727.638	6899.723
2024	M	195640	21422.580	3521520.000	6068.753	3570.430
	F	187180	20496.210	3369240.000	5806.324	3416.035
	C	45180	7694.606	0.000	0.000	0.000
	T	428000	49613.396	6890760.000	11875.076	6986.465
2025	M	198099	21691.841	3565782.000	6145.031	3615.307
	F	189533	20753.864	3411594.000	5879.314	3458.977
	C	45748	7791.342	0.000	0.000	0.000
	T	433380	50237.046	6977376.000	12024.345	7074.284
2026	M	200589	21964.496	3610602.000	6222.271	3660.749
	F	191915	21014.693	3454470.000	5953.203	3502.449
	C	46323	7889.270	0.000	0.000	0.000
	T	438827	50868.458	7065072.000	12175.474	7163.198
2027	M	203110	22240.545	3655980.000	6300.472	3706.758
	F	194327	21278.807	3497886.000	6028.024	3546.468
	C	46905	7988.391	0.000	0.000	0.000
	T	444342	51507.742	7153866.000	12328.496	7253.225
2028	M	205663	22520.099	3701934.000	6379.666	3753.350
	F	196770	21546.315	3541860.000	6103.805	3591.053
	C	47495	8088.873	0.000	0.000	0.000
	T	449928	52155.287	7243794.000	12483.472	7344.402
2029	M	208242	22802.499	3748356.000	6459.667	3800.417
	F	199243	21817.109	3586374.000	6180.518	3636.185
	C	48092	8190.549	0.000	0.000	0.000
	T	455577	52810.156	7334730.000	12640.185	7436.601
2030	M	210860	23089.170	3795480.000	6540.877	3848.195
	F	201747	22091.297	3631446.000	6258.192	3681.883
	C	48697	8293.586	0.000	0.000	0.000
	T	461304	53474.053	7426926.000	12799.069	7530.078

*datas calculated based on ICMR guidelines


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