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Agriculture situation in Meghalaya with special reference to West Khasi Hills district

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Abstract
West Khasi Hills is one of the largest district of Meghalaya covering a geographical area of 3846 sq.km, with net sown area of 137.20 sq. km and 135% cropping intensity. Rice, maize, potato are the main crops grown with varieties of horticultural crops like chow chow, tomato, pea,c arrot, leafy vegatables, ginger, broom grass and temperate fruits. The present study was conducted to project the demand supply of major food items and their gap, to list the major problems and strategies for development of agriculture in the district. Results revealed that the demand of cereals and pulses will be 51.36 and 2.814 thousand tonnes by 2030 in the district, with expected gap of cereals (-26.70), pulses (-2.63) respectively. Major problems in agriculture are monocropping, preference of local varieties, unawareness of government schemes and strategies like policy measures, establishment of FPO and area expansion for agriculture development in the district.

Keywords: West Khasi hills, demand supply, gap, policy measures, FPO

Introduction
Meghalaya is one of the North Eastern states of India located in the remote place of the country bordering with Assam and Bangladesh covering about 22,429 sq.km of the geographical area. As per 2011 census, the state has a population of 29,66,889 in 6,839 villages with decadal growth rate of 27.95%, covering 46 C&RD Blocks in 11 districts and it is a tribal populated state with 86.14% ST population. The major tribes inhabiting the state are the Khasis, Jaintias and the Garo tribe. The agro-climatic zones in Meghalaya is divided into five agro-ecological zones ranging from sub alpine, Sub temperate, sub tropical hill zone, sub tropical plain to mild tropical plain zone. The major occupation of the state is agriculture contributing a major employment upto 81% to the state's population. Though, 81% of the population depend agriculture, the net cropped area is only about 9.87% of the total geographical area of the State. The state is deficit in food grains by 1.22 lakh tonnes annually to feed a population of 2.9 million. The major food crops are Rice and Maize and other Horticultural crops like Orange, Lemon, Pineapple, Guava, Litchi, Banana, Jack Fruits and Temperate Plum, Pear, Peach, Potato, etc. The important cash crops in the State are Ginger, Turmeric. Arecanut, Blackpepper Black Pepper, Tezpatta, Betelvine.

Present status of agriculture in west Khasi hills
West Khasi Hills is one of the largest district of Meghalaya and presently covering an area of about 3846 sq km which is 17.00 percent of the total area of the state. Nongstoin, covering an area of about 76.00 sq. Km, is the Headquarter of the district. The district in the year 2012 was later bifurcated into two districts-the present West Khasi Hills District and new South West Khasi Hills District headquarter at Mawkyrwat comprising 2 (two) C & R D Blocks *viz*., Mawkyrwat and Ranikor C & R D Block. As per 2011 census, the district has a population of 2,87,781 with a literacy rate of 78.83% and a decadal Population Growth (2001 - 2011) of 66249 (29.9%). The land utilization statistic of the district is given in Table 1 showing net sown area of 137.20 sq.km and gross cropped area of 185.19 sq.km taking the cropping intensity upto 135% which is higher than the state. More than 80 per cent of the total population in West Khasi Hills is agrarian as their main source of livelihood is basically agriculture. Agriculture and allied activities provide income and employment for the people in West Khasi Hills. Rice, Maize, potato are the main crops grown in West Khasi Hills. Chow chow, tomato, pea, carrot, leafy vegatables and fruits like plum,*sohphie*, *sohphlang* are the major cash crops of the district. Ginger, Broomgrass are also cultivated extensively in West Khasi Hills in the Sub tropical area bordering with Ri Bhoi district and with Assam. The district populations are mainly engaged in livestock rearing as a source of protein supplement and generation of income.

The main livestock reared are poultry and pigs as backyard farming with 0.6 thousand tonnes of fish production in the year 2019-20 (*Department of Fisheries, Meghalaya, 2020).*

Table 1: Land utilization statistics of West Khasi Hills (2017-18)

Land Classification	Area (sq.km)
Geographical area	3846
Forest area	1560.12
Non-Agricultural area	184.80
Cultivable waste land	771.81
Fallow Land	461.72
Net sown area	137.20
Area Sown more than once	48
Gross cropped area	185.19
Cropping intensity (%)	135

***Source*:** Directorate of Economic and Statistics, Meghalaya

Table 2: Area, production and yield of crops in West Khasi Hills from 2012-17 (Area in hectares; Production in Metric tonnes; Yield in kg/ha)

Sl. No.	Name of Crops	Type	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
1	2	3	4	5		6	7	8
Crops								
1.	Cereals	A	12559	12575	12591	12635	12685	11357
		P	20438	21551	22770	24126	25789	21528
		Y	NA	NA	NA	NA	NA	NA
2.	Pulses	A	72	76	80	82	86	72
		P	143	153	167	183	196	156
		Y	1986	2013	2088	2232	2279	2167
3.	Oilseeds	A	117	123	127	131	139	117
		P	123	132	140	155	170	130
		Y	1051	1073	1102	1183	1223	1111
4.	Vegetables	A	1049	887	897	952	1008	1033
		P	11481	9910	10072	10788	11623	11912
		Y	10945	11172	11229	11337	11531	11531
5.	Fruits	A	2753	905	923	932	1022	1060.5
		P	14747	5119	5284	5386	6769	6955.19
		Y	27471	21756	22097	22329	34560	46832

***Source*:** Directorate of Agriculture, Meghalaya Shillong

Monocropping in lowland areas and mixed cropping in upland areas are the features of agriculture in the district. Majority of the farmers (45.00%) had marginal land holding followed by small land holder (33.33%) and it was happened due to lack of ancestral property, family property and increase in family size (Marbaniang *et.al.*,2017).The scenario of agriculture in the district has to revive with the help of fruitful policy strategies so as to ensure the doubling of farmers' income by 2022. Thus, with this background information, the present study was conducted with the following objectives:

1. To project the demand supply of major food items and the gap in the district.
2. To list out the major agricultural problems and the strategies for development of agriculture in the district.

Materials and Methods

The study was conducted in the year 2019 taking West Khasi Hills district as the sampled area of the study. Secondary data were used for the present study taken from the Annual Reports of the state Department of Agriculture, Meghalaya and from *A Vision Document for the State of Meghalaya 2013*. Crop statistics data of West Khasi Hills were taken from the year 2012 onwards upto present available 2017-18. Information regarding the constraints and strategies of agriculture development in the district were listed based on the observation, experience and understanding of the author through multiple extension programmes like personal contact with the farmers, interactive session during training programmes, diagnostic visit, field days, OFTs FLDs and from various suggestions and feedback of the farmers.

Results and discussion

a. Annual per capita consumption of food in West Khasi Hills

As majority of the population in the district resides in the rural areas and no such urban area, thus per capita consumption of food varies with those from the urban settlers. Following are the annual per capita consumption of food items as recommended by ICMR, 2010 & NSS, 2011-12.

Table 3: Annual per capita consumption of food in West Khasi Hills

Item	Rice	Cereals	Pulses	Oilseeds	Vegs	Fruits	Fish	Meat	Egg	Milk
Per capita consumption	10.23kg /month	400gm/day	8kg/ year	30gm/ day	300gm /day	100gm/day	100gm/week	10.95 kg/yr	180nos/yr	50 kg/yr

***Source*:** ICMR, 2010 & NSS, 2011-12

b. Projected growth of population and demand of food items in West Khasi Hills

Keeping 2017-18 as the base year for projection of population growth and demand of food in the district for the next ten years. Projection for population is calculated from NIPFP estimates at 2011-12 prices with the assumed growth rate; and demand of food is projected as per capita consumption recommended by ICMR, 2010 with respect to population in the district.

Table 4: Projected growth of population and demand of food in *thousand tonnes* in West Khasi Hills for the next 10 years (*As per NIPFP estimates at 2011-12 prices*)

Item	Base year (2017-18)	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Assumed Population Growth	1.11	1.11	1.11	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	0.90
Population	309473	319381	322926	326155	329416	332710	336037	339397	342451	345533	348643	351781
Rice	38	39.20	39.64	40.03	40.43	40.84	41.25	41.66	42.03	42.41	42.79	43.18
Cereals	45.18	46.63	47.14	47.61	48.09	48.57	49.06	49.55	50.00	50.44	50.90	51.36
Pulses	2.476	2.555	2.583	2.609	2.635	2.662	2.688	2.715	2.742	2.764	2.789	2.814
Oilseeds	3.389	3.497	3.536	3.571	3.607	3.643	3.680	3.716	3.753	3.783	3.817	3.852
Vegetables	33.88	34.97	35.36	35.71	36.07	36.43	36.79	37.16	37.53	37.83	38.17	38.52
Fruits	11.296	11.65	11.78	11.90	12.02	12.14	12.26	12.38	12.51	12.61	12.72	12.84
Fish	1.609	1.661	1.679	1.696	1.713	1.730	1.747	1.765	1.782	1.797	1.813	1.829
Meat	3.389	3.497	3.536	3.571	3.607	3.643	3.680	3.716	3.753	3.783	3.818	3.852
Egg (lakh Nos)	557	574	581	587	592	598	604	610	617	621	627	633
Milk	15.47	15.96	16.14	16.30	16.47	16.63	16.80	16.97	17.13	17.27	17.43	17.58

Based on the above projected data shown in Table 4, the population in the district is expected to increase upto 12.21% (35,145) by 2021 and 22.23% by 2030 and by the year 2030 the demand of food items in *thousand tonnes* will be Rice (43.18), Cereals (51.36), Pulses (2.814), Oilseeds (3.852), Vegetables (38.52), Fruits (12.84), Fish (1.82), Meat (3.85), Egg (633 lakh nos.) and Milk (17.58) respectively.

c. Projected gap of major food items in West Khasi Hills

The gap in demand-supply of food items is calculated by taking the difference between the annual production (supply) of the food items and the annual consumption (demand) of the population with an average annual growth rate respectively of the food items for the last six years data (2012-2017).

Table 5a: Projected Gap (G) of major food in West Khasi Hills

Year	Rice ('000 tonnes)			Cereals ('000 tonnes)			Pulses ('000 tonnes)			Oilseeds ('000 tonnes)		
	D	S	G	D	S	G	D	S	G	D	S	G
2020-21	39.20	11.58	-27.62	46.63	22.21	-24.41	2.55	0.16	-2.34	3.49	0.13	-3.36
2021-22	39.64	11.70	-27.93	47.14	22.44	-24.70	2.58	0.16	-2.41	3.53	0.13	-3.40
2022-23	40.03	11.83	-28.20	47.61	22.68	-24.93	2.60	0.16	-2.44	3.57	0.13	-3.43
2023-24	40.43	11.96	-28.47	48.09	22.91	-25.17	2.63	0.16	-2.46	3.60	0.13	-3.47
2024-25	40.84	12.08	-28.75	48.57	23.15	-25.41	2.66	0.17	-2.49	3.64	0.13	-3.50
2025-26	41.25	12.21	-29.03	49.06	23.40	-25.65	2.68	0.17	-2.51	3.68	0.13	-3.54
2026-27	41.66	12.34	-29.31	49.55	23.64	-25.90	2.71	0.17	-2.54	3.71	0.13	-3.57
2027-28	42.08	12.48	-29.60	50.04	23.89	-26.15	2.74	0.17	-2.56	3.75	0.14	-3.61
2028-29	42.41	12.61	-29.80	50.44	24.14	-26.30	2.76	0.17	-2.58	3.78	0.14	-3.64
2029-30	42.79	12.74	-30.05	50.90	24.39	-26.50	2.78	0.18	-2.60	3.81	0.14	-3.67
2030-31	43.18	12.88	-30.30	51.36	24.65	-26.70	2.81	0.18	-2.63	3.85	0.14	-3.70

Table 5b: Projected Gap of major food items in West Khasi Hills

Year	Vegetables ('000 tonnes)			Fruits ('000 tonnes)			Fish ('000 tonnes)			Meat ('000 tonnes)		
	D	S	G	D	S	G	D	S	G	D	S	Gap/Surplus
2020-21	34.97	13.01	-21.96	11.65	7.59	-4.06	1.66	0.61	-1.05	3.49	3.50	0.01
2021-22	35.36	13.40	-21.96	11.78	7.81	-3.97	1.67	0.62	-1.05	3.53	3.55	0.02
2022-23	35.71	13.80	-21.91	11.90	8.04	-3.86	1.69	0.63	-1.06	3.57	3.60	0.03
2023-24	36.07	14.22	-21.85	12.02	8.28	-3.74	1.71	0.64	-1.07	3.60	3.65	0.05
2024-25	36.43	14.64	-21.79	12.14	8.52	-3.62	1.73	0.65	-1.08	3.64	3.70	0.06
2025-26	36.79	15.08	-21.71	12.26	8.77	-3.49	1.74	0.66	-1.08	3.68	3.75	0.07
2026-27	37.16	15.53	-21.63	12.38	9.03	-3.35	1.76	0.67	-1.09	3.71	3.78	0.07
2027-28	37.53	16.00	-21.53	12.51	9.30	-3.21	1.78	0.69	-1.09	3.75	3.81	0.06
2028-29	37.83	16.48	-21.35	12.61	9.57	-3.04	1.79	0.71	-1.08	3.78	3.84	0.06
2029-30	38.17	16.97	-21.20	12.72	9.85	-2.87	1.81	0.73	-1.08	3.81	3.87	0.04
2030-31	38.52	17.48	-21.04	12.84	10.14	-2.7	1.82	0.75	-1.07	3.85	3.90	0.05

Table 5c: Projected Gap (G) of major food items in West Khasi Hills

Year	Egg (lakh Nos)			Milk ('000 tonnes)		
	D	S	G	D	S	G
2020-21	574	150.00	-424	15.96	5.10	-10.96
2021-22	581	152.25	-428.75	16.14	5.17	-10.97
2022-23	587	154.53	-432.47	16.30	5.24	-11.06

2023-24	592	156.84	-435.16	16.47	5.31	-11.16
2024-25	598	159.19	-438.81	16.63	5.38	-11.25
2025-26	604	161.57	-442.43	16.80	5.43	-11.37
2026-27	610	164.00	-446	16.97	5.48	-11.49
2027-28	617	166.46	-450.54	17.13	5.56	-11.57
2028-29	621	168.95	-452.05	17.27	5.64	-11.63
2029-30	627	171.48	-455.52	17.43	5.72	-11.71
2030-31	633	174.05	-459	17.58	5.80	-11.78

Based on the above projected data shown in Table 5a,5b and 5c, the expected gap for the different food items in *thousand tonnes* will be Rice (-30.30), Cereals (-26.70), Pulses (-2.63), Oilseeds (-3.70), Vegetables (-21.04), Fruits (-2.7), Fish (-1.07), Meat (+0.05), Egg (-459) in lakh nos. and Milk (-11.78) by the year 2030.

d. Problems of Agriculture in West Khasi Hills

This unsatisfactory behaviour of agriculture in West Khasi Hills district is due to the following problems that the district agriculture is faced with:

1. **Monocropping:** Monocropping with paddy in the lowland farming system in the district is a common scenario. After paddy cultivation, the land is left fallowed and no more cultivation is taking place. The cause of monocropping is due to non-availability of water supply during winter and the habit of setting free of livestock by the farmers.
2. **Preference of local varieties:** Majority of the farmers grow their own local varieties of paddy, maize, potato except vegetables. They are compelled to use their own because of lack of varieties of their preference either in taste, ease in cultivation like in rice, maize. Lack of seed replacement ratio as seen in case of potato and not getting new seed from the Department are the causes of keeping their own seed for cultivation. The agro climatic conditions also play a major role in the adoption of improved and high yielding crop varieties.
3. **Unawareness of government schemes:** Majority of the farmers are illiterate, lack of extension contact with agriculture workers which is so happened because of poor network connectivity and road transportation. This situation is very common in every village which hampers their knowledge and access to developmental schemes.
4. **Training:** The farmers are not that interested in attending training programmes conducted by different training institutions. This happens because farmers consider trainings as of less importance and do not want to waste their time attending trainings especially during farming operations. Sometimes it so happened that individual participating in training are those who are not really involved in cultivation.

e. Strategies for development of Agriculture in West Khasi Hills

i) Long term strategies: The following are the long term strategies that could be helpful in determining the measures for increasing production and productivity of crops and livestock in the district.

a. Classification of farmers based on their livelihood dependency so that the real farmers could be identified easily.
b. Land tenure system of the district is to be surveyed thoroughly so that a useful government policy is to be intervened for the overall welfare of the farmers.
c. Introduction of government policies for the farming communities like law and regulations for stray livestock during winter, provision of water supply so that crop cultivation could be taken up. Policy of introduction of Agriculture subject in the school, colleges must be taken up to create the interest and importance of Agriculture in the state.

ii) Medium term strategies: The following are the medium term strategies that could be helpful in determining the measures for increasing production and productivity of crops and livestock in the district.

a. Establishment of Farmer Producer Organizations for creating ample scope in production, marketing of farm produces.
b. Research studies/Impact studies will be helpful for the government institutions and policy makers.
c. Establishment of market linkage facilities and post-harvest for potential growing villages.

iii) Short term strategies

a. Group/Community approach for conducting OFT/FLD, various demonstration programmes for wide adoption of technologies.
b. Area expansion in vegetable cultivation, especially in lowland farming system to introduce paddy-pea croppping system.
c. Reducing cost of cultivation through adoption of farming intervention like use of power tiller for land preparation, minimum/zero tillage, intercropping farming system.
d. Capacity development programmes of farmers through linkage programmes with the different government institutions and schemes like KVK, ATMA, NABARD, RKVY etc.
e. Support to farming infrastructure through linkage programme with MGNREGA programmes

Conclusion

Development of agriculture in West Khasi Hills is the most crucial as every section of the society still depends on agriculture either directly or indirectly for their daily livelihood. As the district is almost cent percent rural areas, development of this sector is essential to reduce the migration of villagers to cities, it would be also helpful for the unemployed rural youth for self employment. In the district, only agriculture alone has the potential in contributing to the state GDP which will ultimately help the national GDP.

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