Diversity of Cropping Pattern in Bogra

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ABSTRACT

With a view to document the existing cropping patterns, cropping intensity and crop diversity, a study was carried out over all the upazilas of Bogra agricultural region during 2015-16. A pre-tested semi-structured questionnaire was properly used for this purpose. In the findings it was recorded that 21.88% of net cropped area (NCA) of the region was occupied by the cropping pattern Boro–Fallow–T. Aman. This pattern was found to be distributed over 27 upazilas out of 35. The second largest area, 13.26% of NCA, was covered by Potato–Boro–T. Aman, which was spread over 17 upazilas. A total of 177 cropping patterns were identified in the whole region in this investigation. The highest number of cropping patterns was identified 36 in Nandigram upazila and the lowest was six in Dupchachia and Kahalu upazila of Bogra district. The lowest crop diversity index (CDI) was reported 0.718 in Raiganj upazila of Sirajganj district followed by 0.972 in Bera upazila. The range of cropping intensity values was recorded 183-291%. The maximum value was for Khetlal upazila of Joypurhat district and minimum for Bera of Pabna. As a whole the CDI of Bogra region was calculated 0.966 and the average cropping intensity at regional level was 234%.

Key words: Diversity index, land use, cropping system and flash flood

INTRODUCTION

A total of 35 upazilas of four districts formed the Bogra agricultural region. It has a wide diversity in land topography and soil characters ranging from river-eroded area to Barind Tract. This region belongs to Tista Meander Floodplain (AEZ-3), Karatoa-Bangali Floodplain (AEZ-4), Lower Atrai Basin (AEZ-5), Active Brahmaputra-Jamuna Floodplain (AEZ-7), Active Ganges Floodplain (AEZ-10), High Ganges River Floodplain (AEZ-11), Low Ganges River Floodplain (AEZ-11), Low Ganges River Floodplain (AEZ-12), Level Barind Tract (AEZ-25) and North-eastern Barind Tract (AEZ-27) (FAO, 1988).

Majority area of this region is very suitable for agricultural crop production especially in cereals and vegetables. The cropping intensity is much higher than the other region of the country. Shortage of surface water, serious flooding and river erosion are location-specific critical problems. Low moisture-holding capacity, low organic matter content and low natural fertility are special characters of the Barind Tract.

Cropping system is the crop production activity of a farm which includes all cropping patterns grown on the farm resources, other household enterprises and the physical, biological, technological and socioeconomic factors or environments. A cropping pattern is the yearly sequence, temporal and partial arrangement of crops in a given land area. It is dependent on physical, historical, social, institutional and economic factors as well as government policies (Agrawal and Kassam, 1976). The cropping pattern and the changes therein depend on a large number of factors like climate, soil type, rainfall, agricultural technology, availability of irrigation facilities and other inputs, marketing and transport facilities and growth of agro-industries (Neena, 1998; Gadge, 2003; Rashid et al., 2005).

The yields of cereal crops are tending to stagnation, even in favourable environments. Moreover, cultivable land area is decreasing

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day by day in the country. To increase the system productivity of the total environment it needs to bring diversity in enterprises for better utilization of limited resources. Detailed information on land situation and cropping systems is a prerequisite for a fruitful development programme. Diversified cropping pattern may be an option for the farmers as a coping strategy against risks (Mandal and Bezbaruah, 2013). Typology of different cropping systems is the base for the managers of these systems to intensify production (Shriar, 2000). There is a strong need for judicious and appropriate use of limited resources in case of intervention selection that does not lead to increased mal adaption or inequity in the society over long term. Existing trends of available agricultural lands is most essential requirement for any land use planning related to farming and food security in a sustainable manner. Therefore, an increased understanding of arable land use based on the cropping system is essential for the appropriate intervention in sustainable way. In these contexts, existing cropping patterns along with their diversity of such complex agricultural region are very crucial for risk minimization and overall improvement. productivity The specific objectives of the present study were to:

- Understand the existing cropping patterns scenario in Bogra region
- Visualize the existing land use pattern at • upazila and regional level
- Determine the crop diversity and cropping • intensity at local and regional level.

METHODOLOGY

Thirty-five upazilas of Bogra, Joypurhat, Pabna, and Sirajganj districts under Bogra agricultural region were the locale of this study. Data were collected using double stage procedure. At initial stage, data were collected through pretested semi-structured questionnaire from 35 pre-assigned Sub-Assistant Agriculture Officers (SAAO) of each upazila during October 2015 at upazila level. SAAOs were purposively pre-

questionnaire was explained along with proper guidelines to the AEOs or UAOs or both and handed over to them at each Deputy Director's office of Department of Agricultural Extension (DAE) during monthly meeting for the sake of accurate data collection. The filled questionnaires were collected by the scientists of RFS Division, checked and analyzed to find the inconsistencies of the supplied data before validation workshop. All the inconsistencies among the information were documented. The collected data along with documented inconsistencies were discussed in district level workshop for necessary correction and validation. Second stage of data collection was a day-long data validation workshop at district level. The workshop dates were 26 November 2015 for Sirajganj; 14 January 2016 for Bogra; 2 February 2016 for Pabna; and 20 September 2016 for Joypurhat. Four field-workers i.e. one SAPPO and three SAAOs experienced and engaged in crop-based data documentation, all officers from all upazilas viz UAOs, AEOs, AAEOs, DD (DAE), DD (Horticulture), DD of Seed Certification Agency, DTO and ADDs, one representative from Agricultural Training Institute (ATI) and scientists of BRRI regional station, Kushtia, and Rangpur, participated in the data validation workshop. The number participants of validation workshop of ranged from 50 to 92 in each district. All the participants were divided into three to four groups for data validation. Each group was facilitated by two RFSD scientists to finalize and validate the data and authenticated data were captured. Crop diversity index was calculated by using the following equation described by Kshirsagar et al. (1997). (

selected by Agriculture Extension Officers

(AEO), Additional Agriculture Officer (AAO)

and Upazila Agriculture Officer (UAO) or

altogether. Prior to data collection, the pre-tested

$$CDI_i = 1 - \sum_{j=o}^n \left(\frac{a_{ij}}{A_i} \right)^2$$

Where, CDI₁ = Crop Diversity Index a_{ii} =Area planted to the jth crop in the ith location

A_i = Total area planted under all crops

The index is zero for a land area growing only one crop. It approaches unity as the level of diversity increases. Compilation and processing of collected data were done using Micro Soft Excel programme. Descriptive statistics were used to facilitate the presentation of the findings.

RESULTS AND DISCUSSION

Land use

Table 1 presents the status of agricultural land utilization. The net cropped area of the Bogra region is 668,440 ha. Crops occupied the particular land for round the year were considered under annual crops. The major annual crops reported in the region were banana, papaya, sugarcane, betel leaf, ginger and turmeric. The annual crops area in different upazilas ranged from 10 to 3,500 ha. The annual crops area accounted only 1.70 % of the net cropped area (NCA) in the region. At a glance the region possesses 7.58% single cropped area (SCA), 48.09% double cropped area (DCA), 41.15% triple cropped area (TCA). The quadruple cropped area also exists as a very negligible portion (0.76%) and was limited in only six upazilas viz Bogra, Dhunat, Nandigram, Sherpur, Sonatola and Atghoria. Most of the upazilas of Bogra and Joypurhat district cropping intensity was very high (246%-291%) which were dominating by the TCA over SCA and DCA (Table 1). The TCA had the major share of NCA in Adamdighi, Bogra sadar, Dupchachia, Kahalu, Nandigram, Shibganj and Sonatola upazilas of Bogra district, all five upazilas of Joypurhat district, Iswardi, Pabna sadar and Santhia of Pabna district and Kazipur of Sirajganj district. A few upazilas were dominated by DCA viz-Dhunat, Gabtali, Sariakandi, Sherpur and Shajahanpur of Bogra district. In Pabna district Atghoria, Bera, Bhangura, Chatmohar, Faridpur and Sujanagar upazilas and in Sirajganj district all upzilas except Kazipur were dominated by DCA over SCA and TCA (Table 1). The area which could not defined under SCA, DCA,

TCA or QCA was considered as others whose coverage is less than 1% of the NCA. For availability of irrigation water in dry season, supply of modern varieties of various crops, skilled technology transfer system, knowledge of modern crop management practices, good communication and marketing facilities helped increasing land use efficiency in a given area (FAO, 1988).

Cropping patterns of Bogra

In total 177 cropping patterns were observed in Bogra region of which six cropping patterns with exclusive rice crop covers about 34% of the NCA. There were 55 cropping patterns with exclusive non-rice crop occupying over 12% of the NCA. Rest of the NCA i.e. about 54% area is covered by 116 rice - non rice cropping patterns (Appendix 1).

Rice and non-rice crops at a glance

Table 2 presents six cropping patterns where rice was the only crop round the year. It comprises about 34% of the NCA in the region. Among them single rice, double rice and triple rice areas represent around 6%, 25% and 3% respectively. It reflects the unparallel dominance of rice in the cropping systems in Bogra region. In case of individual pattern, Boro-Fallow-T. Aman has the highest coverage (approx. 22%) and was recorded in 27 upazilas out of 35. The second dominant pattern single Boro area occupied 5.68% of NCA which was reported in 21 upazilas. Boro-Aus-T. Aman covered 3% of NCA and was obsrved in 15 upazilas. Single T. Aman area was very negligible (0.23%) with its existence in only two upazilas.

In the current investigation, 55 cropping patterns were identified that was free from rice. Among these 55 patterns first 40 have been arranged in descending order in Table 3. The rest 15 patterns with negligible area coverage (Table 9) where they are arranged with other patterns of different categories. Aggregate of the 55 patterns have engaged 82,815 hectares of land, which is equivalent to more than 12% of NCA in the region. In critical comparison it is clear that exclusive rice area is about three

Table 1. Land use of different upazilas in Bogra region (area in hectare), 2014-15.

	Upazila	Area of upazila	Annual crop	SCA	DCA	TCA	QCA	Other	NCA	C.I. (%)
01	Adamdighi	16890	40	200	4450	7920	0	130	12740	261
02	Bogra	17734	150	0	1940	8700	300	110	11200	282
03	Dhunat	24712	50	920	14750	3570	150	100	19540	215
04	Dubchachia	16426	30	0	3090	10490	0	110	13720	277
05	Gabtali	24375	120	1210	12980	4710	0	140	19160	218
06	Kahalu	23879	30	60	4700	14310	0	130	19230	274
07	Nandigram	26551	10	0	9000	9500	3700	100	22310	276
08	Sariakandi	40858	40	3700	15620	4850	0	130	24340	205
09	Sherpur	29640	130	1490	15010	6390	790	130	16040	227
10	Shibganj	31148	150	0	3360	21960	0	120	23950	282
11	Shajahanpur	22108	620	630	7860	7290	0	130	26070	241
12	Sonatola	15693	150	730	5790	6920	130	130	13850	246
13	Akkelpur	14046	90	0	4100	6505	0	145	10840	260
14	Joyprhat	23864	800	100	6030	12340	0	130	19400	259
15	Kalai	16636	10	0	1485	12280	0	135	13910	289
16	Khetlal	14260	30	10	1010	10490	0	140	11680	291
17	Panchbibi	27853	570	0	9800	12100	0	200	22670	251
18	Atghoria	18380	220	800	6710	6130	30	130	14020	237
19	Bera	24871	700	3540	12330	1250	0	180	18000	183
20	Bhangura	13428	80	2170	6890	1780	0	160	11080	196
21	Chatmohar	29405	120	1150	17950	5700	0	150	25070	218
22	Faridpur	13897	40	1000	9350	1000	0	150	11540	200
23	Iswardi	26947	3500	30	2590	12530	0	150	18800	247
24	Pabna sadar	44259	700	1580	11000	22200	0	120	35600	256
25	Santhia	33152	270	0	5950	19100	0	150	25470	274
26	Sujanagar	33444	290	3750	16100	4370	0	180	24690	201
27	Belkuchi	16254	50	0	10300	2440	0	160	12950	219
28	Chowhali	23209	10	4440	4220	3940	0	100	12710	196
29	Kazipur	34763	300	9280	5840	7350	0	130	22900	190
30	Kamarkhanda	9163	120	540	4220	2700	0	140	7720	227
31	Raiganj	26667	400	1100	17880	2300	0	120	21800	203
32	Shahjadpur	32462	10	1870	16900	6000	0	120	24900	217
33	Sirajganj	30855	1500	1240	16550	4220	0	190	23700	206
34	Tarash	29732	10	3675	17635	3305	0	125	24750	198
35	Ullapara	41461	40	5440	18070	8390	0	150	32090	209
	Bogra region		11380	50655	321460	275030	5100	4815	668440	234

SCA-Single cropped area, DCA-Double cropped area, TCA-Triple cropped are, QCA-Quadruple cropped area, NCA-Net cropped area and C.I.-Cropping Intensity.

Table 2.	Cropping	patterns with	exclusive ric	e in B	ogra region,	2014-15.
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	Cropping pattern	Area (ha)	% of NCA	Frequency (no. of upazila)
01	Boro-Fallow-T. Aman	146250	21.87	27
02	Boro-Fallow-Fallow	37300	5.58	21
03	Boro-Aus-T. Aman	19700	2.95	15
04	Boro–B. Aman	18650	2.79	10
05	Fallow-Fallow-T. Aman	1550	0.23	2
06	Boro-Aus-Fallow	670	0.10	3
	Total area for exclusive rice	225000	33.66	-

NCA-Net cropped area.

Table 3 Cropping	natterns with	exclusive	non-rice in	Boora r	egion (2014-15
rable 5. Cropping	patterns with	exclusive	non-ne m	Dugiai	egion,	2014-13.

	Cropping pattern	Area (ha)	% of NCA	Frequency (no. of upazila)
01	Vegetab-Vegetab	16030	2.40	22
02	Onion-Jute-Fallow	10080	1.51	5
03	Lentil-Jute-Fallow	6650	0.99	10
04	Chilli–Jute–Fallow	4620	0.69	10
05	Groundnut-Fallow-Fallow	4280	0.64	9
06	Wheat-Jute-Fallow	4090	0.61	11
07	Vegetab-Vegetab-Fallow	3730	0.56	10
08	Maize-Jute-Fallow	3300	0.49	6
09	Onion-Vegtab-Vegetab	3100	0.46	14
10	Maize-Fallow-Fallow	2520	0.38	5
11	Wheat-Vegetab-Vegetab	2100	0.31	3
12	Millet (kaon)+Sesame-Fallow	1720	0.26	4
13	Chilli-Vegetab-Fallow	1650	0.25	10
14	Potato-Maize-Vegetab	1500	0.22	1
15	Vegetab-Jute-Fallow	1240	0.19	4
16	Fallow-Fallow-Blackgram	1210	0.18	6
17	Grasspea-Fallow-Fallow	1005	0.15	3
18	Vegetab-Onion-Aus	1000	0.15	1
19	Wheat-Sesame-Fallow	1000	0.15	3
20	Vegetab-Fallow-Fallow	900	0.13	3
21	Wheat-Fallow-Blackgram	900	0.13	1
22	Lentil-Sesame-Fallow	810	0.12	4
23	Groundnut-Fallow-Blackgram	800	0.12	1
24	S.Potato-Jute-Fallow	780	0.12	3
25	Chilli-Fallow-Fallow	710	0.11	4
26	S.Potato-Fallow-Fallow	675	0.10	14
27	Coriander-Vegetab-Fallow	630	0.09	2
28	Grasspea-Jute-Fallow	550	0.08	3
29	Sesame–Fallow–Blackgram	500	0.07	1
30	Wheat–Jute–Blackgram	500	0.07	1
31	Garlic–Jute–Fallow	430	0.06	2
32	Grasspea-Sesbania-Fallow	400	0.06	1
33	Groundnut-Millet (kaon)-Fallow	380	0.06	2
34	Vegetab-Jute-Vegetab	380	0.06	1
35	Onion-Sesame-Fallow	350	0.05	2
36	Garlic-Vegetab-Vegetab	345	0.05	9
37	Groundnut-Sesame-Fallow	300	0.04	1
38	Lentil-Vegetab-Vegetab	270	0.04	5
39	Wheat-Fallow-Fallow	230	0.03	1
40	Vegetab-Fallow-Blackgram	200	0.03	3
41-55	Other 15 patterns (in Table 9)	950	0.14	-
	Total area for non-rice exclusive	82815	12.39	

folds of exclusive non-rice area. In Bogra region crop diversity is much wider than that of other regions like Sylhet and Chittagong where exclusive rice area covers 37 folds and 23 folds, respectively of exclusive non-rice area (Muttaleb *et al.*, 2017; Shahidullah *et al.*, 2017). Appropriate cropping patterns may facilitate maximum possible land utilization as well as efficient use of other scarce resources in a sustainable manner. Diversified cropping

pattern may be an option for the farmers as a coping strategy against risks (Mandal and Bezbaruah, 2013). Typology of different cropping systems is the base for the managers of these systems to intensify production (Shriar, 2000).

Deep water rice

Table 4 presents deep water rice dominating 21 patterns which intogether covered 9.48% of NCA. Among thm, first 18 patterns cover 63,160 ha whereas other three minutely distributed patterns cover only 220 ha (Table 9). Boro-B. Aman cropping pattern covers the highest area of 18,650 hectares which represents about 2.79% of the regions NCA. This pattern is distributed over 10 upazilas out of 35. The second highest Wheat-B. Aman cropping pattern covers 7,920 hectares and distributed over only six upazilas. Grasspea-B. Aman is the third dominant cropping pattern under deep water ecosystem which is distributed over the highest number of upazilas. Deep water rice with lentil, maize, pea and grass pea were the narrow existence covered only 0.3 % of NCA. The water level of this ecosystem ranges between 150 and 400 cm, and water usually remains 3-4 months. Special rice varieties known as 'floating rice' are planted in these areas. In the past Bangladesh had had a land coverage of 3 million hectares for deepwater rice (Jackson et al., 1972). In course of time the continuous effort on modern agriculture shifted DWR area mainly to modern Boro. Now the area under deep water rice in Bangladesh is reduced to 0.4 million hectares (Nasim et al., 2017). Though this cropping system is less productive than other modern cropping systems, however, the specific fragile ecosystem still struggling because of no other alternatives.

Non-rice cereal crops

There were forty-three cropping patterns recorded in Table 5. In these patterns wheat and maize were major crops whereas barley and millets (*cheena* and *kaon*) were recognized as minor crops. Wheat-Jute-T. Aman was the most dominant pattern which possessed 2.18% of NCA and reported in 24 upazilas out of 35.

In this documentation the aggregate of nonrice cereal cropping patterns covered 9.61% of NCA. The total area coverage under nonrice cereal crops is 64,475 ha where the first 31 patterns presented in the Table 5 covered 63,730 ha. The remaining 12 patterns are scatteredly distributed over the region which is presented in Table 9. The area coverage of these 12 patterns is only 745 ha which is about 0.11% of the net cropped area.

Oil-seed crops

Table 6 presents 31 cropping patterns of oil seed crops. Among the patterns the first 34 patterns possessed 135,700 ha whereas other five patterns covered only 385 ha (Table 9). Mustard is covering the largest area whereas groundnut is cultivated in the smallest area among the oil-seed crops. The mustard crop alone was leading 15 cropping patterns with an area coverage of 111,050 ha which is equivalent to 16.61% of NCA in the region and it is fourfifths of the total oil-seed crop area. Mustard-Boro-T. Aman is a favorite cropping pattern reported in 25 upazilas in this region and the area coverage is about 6.00% of NCA although the highest area coverage among the oil-seed crops is covered by Mustard-Boro-Fallow cropping pattern (7.62% of NCA).

Pulse crops

In total 41 cropping patterns of the pulse crops are enlisted in the Table 7. Among them grasspea was covering the largest area (17,445 ha) whereas pea is cultivated in the smallest area (680 ha). Lentil-Jute-Fallow was the dominant cropping pattern in respect of area coverage under pulse crop in the region on the other hand Gasspea-B. Aman was the most widely distributed pulse crop pattern over the region (Table 7). The total area coverage of pulse crop is about 49,585 hectares of which 34 patterns listed in the Table 7 covered 48,880 ha area. The remaining 705 ha area is covered by other seven patterns which are presented in the Table 9. In case of pea there are only two cropping patterns viz Pea-B. Aman and Pea-Aus-Vegetable. These two patterns in-together occupied only 0.1% of NCA. In the documentation of pulse

Table 4.	Cropping patterns	under deep	water rice ecos	vstem in Bogr	a region, 2014-15.
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Cropping pattern	Area (ha)	% of NCA	Frequency (no. of upazila)
01 Boro–B. Aman	18650	2.79	10
02 Wheat–B. Aman	7920	1.18	6
03 Grasspea–B. Aman	6470	0.97	12
04 Mustard–Boro–B. Aman	5000	0.75	4
05 Onion–B. Aman	3650	0.55	7
06 Garlic–B. Aman	3100	0.46	4
07 Blackgram–B. Aman	2950	0.44	5
08 Grasspea-Boro-B. Aman	2600	0.39	2
09 Mustard–B. Aman	2300	0.34	3
10 Blackgram (Fod)–Boro–B. Aman	2000	0.30	1
11 Onion-Sesame+B. Aman	1800	0.27	2
12 Grasspea-Sesame+B. Aman	1700	0.25	1
13 Fallow–Sesame+B. Aman	1400	0.21	2
14 Lentil-Sesame+B. Aman	980	0.15	1
15 Mustard–B. Aus+B. Aman	800	0.12	1
16 Lentil–B. Aman	790	0.12	4
17 Maize–B. Aman	650	0.10	2
18 Pea–B. Aman	400	0.06	2
19-21 Other three patterns (in Table 9)	220	0.03	-
Total DW rice	63380	9.48	

Table 5. Cropping patterns for non-rice cereal crops in Bogra region, 2014-15.

Cropping pattern	Area (ha)	% of NCA	Frequency (no. of upazila)
01 Wheat-Iute-T. Aman	14540	2.18	24
02 Wheat–B. Aman	7920	1.18	6
03 Wheat-Aus-Fallow	4700	0.70	2
04 Wheat-Jute-Fallow	4090	0.61	11
05 Wheat–Aus–T. Aman	3630	0.54	13
06 Maize-Jute-Fallow	3300	0.49	6
07 Maize-Fallow-Fallow	2520	0.38	5
08 Wheat-Sesame-T. Aman	2470	0.37	7
09 Maize-Jute-T. Aman	2255	0.34	4
10 Wheat-Vegetab-Vegetab	2100	0.31	3
11 Wheat-Mungbean-T. Aman	1990	0.30	6
12 Millet (kaon)+Sesame–Fallow	1720	0.26	4
13 Wheat-Fallow-T. Aman	1560	0.23	3
14 Millet (kaon)–Fallow–T. Aman	1500	0.22	1
15 Potato-Maize-Vegetab	1500	0.22	1
16 Potato-Maize-T. Aman	1200	0.18	4
17 Wheat-Sesame-Fallow	1000	0.15	3
18 Wheat-Fallow-Blackgram	900	0.13	1
19 Wheat-Maize-T. Aman	700	0.10	1
20 Maize–B. Aman	650	0.10	2
21 Maize-Fallow-T. Aman	640	0.10	5
22 Wheat–Jute–Blackgram	500	0.07	1
23 Groundnut-Millet (kaon)-Fallow	380	0.06	2
24 Maize-Maize-T. Aman	330	0.05	4
25 Maize–Aus–Fallow	320	0.05	3
26 Maize-Sesame-T. Aman	300	0.04	1
27 Potato-Maize-Aus	300	0.04	1
28 Potato-Maize-Aus-Vegetab	300	0.04	1
29 Wheat-Fallow-Fallow	230	0.03	1
30 Millet (cheena)–Jute–Fallow	170	0.03	1
31 Barley–Fallow–Fallow	15	0.00	2
32-43 Other 12 patterns (in Table 9)	745	0.11	
Total for non-rice cereal crops	64475	9.61	

	Cropping pattern	Area (ha)	% of NCA	Frequency (no. of upazila)
01	Mustard-Boro-Fallow	50940	7.62	15
02	Mustard–Boro–T. Aman	40110	6.00	25
03	Mustard–Boro–B. Aman	5000	0.75	4
04	Groundnut-Fallow-Fallow	4280	0.64	9
05	Mustard–Jute–T. Aman	2700	0.40	3
06	Mustard-Boro-Aus	2560	0.38	2
07	Wheat-Sesame-T. Aman	2470	0.37	7
08	Mustard-Boro-Aus-T. Aman	2330	0.35	4
09	Mustard–B. Aman	2300	0.34	3
10	Mustard-Aus-T. Aman	2200	0.33	4
11	Onion-Sesame-T. Aman	2200	0.33	2
12	Onion-Sesame+B. Aman	1800	0.27	2
13	Millet (kaon)+Sesame-Fallow	1720	0.26	4
14	Grasspea-Sesame+B. Aman	1700	0.25	1
15	Lentil-Sesame-T. Aman	1680	0.25	6
16	Fallow-Sesame+B. Aman	1400	0.21	2
17	Wheat-Sesame-Fallow	1000	0.15	3
18	Lentil-Sesame+B. Aman	980	0.15	1
19	Grasspea-Sesame-T. Aman	970	0.15	2
20	Lentil-Sesame-Fallow	810	0.12	4
21	Groundnut-Fallow-Blackgram	800	0.12	1
22	Mustard–B.Aus+B. Aman	800	0.12	1
23	Mustard-Boro-Jute	700	0.10	1
24	Potato-Sesame-T. Aman	600	0.09	2
25	Groundnut-Jute-T. Aman	500	0.07	1
26	Sesame-Fallow-Blackgram	500	0.07	1
27	Mustard-Aus-Blackgram	400	0.06	1
28	Mustard–Mungbean–T. Aman	400	0.06	1
29	Groundnut-Millet (kaon)-Fallow	380	0.06	2
30	Onion-Sesame-Fallow	350	0.05	2
31	Mustard-Sesame-T. Aman	320	0.05	2
32	Groundnut-Sesame-Fallow	300	0.04	1
33	Maize-Sesame-T. Aman	300	0.04	1
34	Sesame-Aus-Fallow	200	0.03	1
35-39	Other five patterns (in Table 9)	385	0.06	-
	Total oil-seed crops	136085	20.36	

crop grasspea reported its widest spreading in the region. One pattern is available in 12 out of 35 upazilas. Finally the aggregate area of the pulse crop cropping system stands for 7.42% of the NCA in Bogra region.

Vegetables and spices crops

Fifty-three cropping patterns have been arranged in descending order according to area coverage (Table 8). Potato and other vegetables of Rabi, Kharif-I and Kharif-II; spices viz chilli, onion, garlic are included in this list. A row is included at the end of the Table 8 representing an aggregate of 25 patterns of vegetables and spices, which is elaborately presented in the Table 9 with other patterns of different categories. The most contributing cropping pattern is Potato-Boro-T. Aman covering about 13.26% of NCA, which was distributed over 17 upazilas. Year round vegetable was the second most dominant cropping pattern which possessed 16,030 ha covering 2.40% of NCA and recorded in 22 upazilas out of 35. Onion-Jute-Fallow is the third dominant pattern but exists only in five upazilas. Among the spices onion occupied the major area under

Table 7.	Cropping	patterns	of pulse	crops in	Bogra	region,	2014-15.	
	cropping	Parrentio	or paroe	eropo m	~~~~~			

Crop	pping pattern	Area (ha)	% of NCA	Frequency (no. of upazila)
01 Lent	til-Jute-Fallow	6650	0.99	10
02 Gras	sspea–B. Aman	6470	0.97	12
03 Lent	til-Aus-T. Aman	3340	0.50	9
04 Blac	kgram–B. Aman	2950	0.44	5
05 Gras	sspea-Boro-Fallow	2950	0.44	5
06 Gras	sspea-Boro-B. Aman	2600	0.39	2
07 B.gr	am(Fodder)–Boro–B. Aman	2000	0.30	1
08 Whe	eat-Mungbean-T. Aman	1990	0.30	6
09 Boro	o-Fallow-Blackgram	1960	0.29	7
10 Gras	sspea-Sesame+B. Aman	1700	0.25	1
11 Lent	til-Sesame-T. Aman	1680	0.25	6
12 Falle	ow–Fallow–Blackgram	1210	0.18	6
13 Gras	sspea-Fallow-Fallow	1005	0.15	3
14 Lent	til-Sesame+B. Aman	980	0.15	1
15 Lent	til-Jute-T. Aman	975	0.15	7
16 Gras	sspea-Sesame-T. Aman	970	0.15	2
17 Whe	eat-Fallow-Blackgram	900	0.13	1
18 Lent	til-Sesame-Fallow	810	0.12	4
19 Gras	sspea-Jute-T. Aman	800	0.12	1
20 Grou	undnut-Fallow-Blackgram	800	0.12	1
21 Lent	til–B. Aman	790	0.12	4
22 Onio	on-Aus-Blackgram	740	0.11	3
23 Gras	sspea–Jute–Fallow	550	0.08	3
24 Sesa	me–Fallow–Blackgram	500	0.07	1
25 Whe	eat–Jute–Blackgram	500	0.07	1
26 Boro	o-Aus-Blackgram	410	0.06	2
27 Gras	sspea-Sesbania-Fallow	400	0.06	1
28 Mus	stard-Aus-Blackgram	400	0.06	1
29 Mus	stard-Mungbean-T. Aman	400	0.06	1
30 Pea-	-B. Aman	400	0.06	2
31 Lent	til-Aus-Fallow	300	0.04	3
32 Pea-	-Aus-Vegetab	280	0.04	1
33 Lent	til-Vegetab-Vegetab	270	0.04	5
34 Veg	etab–Fallow–Blackgram	200	0.03	3
35-41 Othe	er seven patterns (in Table 9)	705	0.11	
Tota	al pulse crop	49585	7.42	

cultivation. Vegetables like colocasia, okra, amaranths, brinjal, cucurbits, etc are grown in medium upland adjacent to rice fields during rainy season and potato, sweet gourd, cole crops, leafy vegetables etc are grown during winter season in Tripura (Das *et al.*, 2015).

Sporadic and distinct cropping patterns

There are some cropping patterns which are extremely location-specific, however, with a large area coverage. The Blackgram (fodder)– Boro–B. Aman is grown on 2,000 hectares (Table 7) in Shahjadpur upazila of Sirajganj district. It is a unique pattern in Bangladesh. Shahjadpur is the main centre of the milch cattle/cow under the supervision of Milk Vita Cooperative Systems. Now-a-days other NGO and private enterprises are also going there for milk collection. For feeding these cattle the farmers of the locality has adopted this cropping system. In this system blackgram is grown as relay crop where the seeds of blackgram are broadcast in the standing deepwater rice at flowering stage. After harvesting of rice, blackgram is rapidly grown and are subjected to cattle feeding at green stage. Grasspea-

Table 8.	Cropping patter	ns for vegetables	and spices cro	ps in Bogra	region, 2014-15.
	- II OI		· · · · · · · · · · · · ·	r · · · · · ·	

Off Potato-Boro-L. Aman 88610 12.26 17 02 Vegetab-Vegetab-Vegetab* 16030 2.40 92 03 Onion-jute-FLAman 9330 1.40 12 05 Vegetab-Boro-T. Aman 9330 1.40 12 05 Vegetab-Boro-T. Aman 9330 1.40 12 06 Chilli-Jute-Fallow 4620 0.69 10 07 Boro-Vegetab-Fallow 3730 0.56 10 09 Onion-Setab-Vegetab-Fallow 3730 0.56 10 09 Orion-B. Aman 3100 0.46 14 12 Chilli-Jute-T. Aman 2200 0.34 2 13 Potato-Boro-Aus-T. Aman 2200 0.33 2 14 Onion-Sesame-T. Aman 1900 0.27 2 19 Vegetab-Hallow 2000 0.31 3 16 Vegetab-Fallow 1650 0.25 5 17 Onion-Aus-T. Aman 1970	Cropping pattern	Area (ha)	% of NCA	Frequency (no. of upazila)
10 Vegetab-Vegetab-Vegetab* 16/30 2.40 22 10 Onion-Jute-Fallow 10080 1.51 5 04 Onion-Jute-Fallow 4620 0.69 10 05 Chili-Jute-Fallow 4620 0.69 10 07 Boro-Vegetab/[Float/Norm**) 4000 0.60 6 08 Vegetab-Vegetab-Vegetab 3730 0.66 10 09 Onion-B. Aman 3650 0.55 7 10 Garik-B. Aman 2300 0.34 2 12 Droion-B. Aman 2200 0.33 2 13 Potato-Boro-Aus-T. Aman 2200 0.31 5 14 Onion-Seame-T. Aman 1910 0.29 3 18 Onion-Seame-T. Aman 1900 0.27 6 19 Vegetab-Aus-Fallow 2060 0.31 5 10 Orion-Seame-T. Aman 1600 0.25 6 21 Vegetab-Fallow-T. Aman 1600 0.25 10 22 Vegetab-Fallow-T. Aman 1280 <	01 Potato-Boro-T. Aman	88610	13.26	17
0 Non-Jue - Fallow 10080 1.51 5 04 Onion-Jue - T. Aman 930 1.40 12 05 Vegetab-Borro-T. Aman 4760 0.71 7 06 Chilli-Juto-Fallow 4620 0.69 10 07 Borro-Vegetab/Float/Norm**) 4000 0.60 6 08 Vegetab-Vegetab-Fallow 3730 0.56 10 09 Onion-B. Aman 3100 0.46 14 11 Onion-Vegatab-Vegetab 3100 0.46 14 12 Chilli-Jute-T. Aman 2200 0.34 2 14 Onion-Sesame-T. Aman 2200 0.31 5 15 Vegetab-Aus-Fallow 2060 0.31 5 16 Vegetab-Aus-Fallow 2060 0.31 5 17 Onion-Aus-T. Aman 1910 0.22 3 18 Onion-Sesame+B. Aman 1665 0.25 5 19 Vegetab-Fallow-T. Aman 1670 0.25 5 10 Vegetab-Maize-T. Aman 1665 0.25 10 22 Polato-Maize-T. Aman 1665 0.25 10 23 Polato-Maize-T. Aman 1280 0.1	02 Vegetab-Vegetab-Vegetab*	16030	2.40	22
04 Onion-Tute-T. Aman 930 1.40 12 05 Vegetab-Boro-T. Aman 4760 0.71 7 06 Chill-Jute-Fallow 4620 0.69 10 07 Boro-Vegetab/Float/Norm**) 4000 0.60 6 08 Vegetab-Vegetab-Tallow 3730 0.56 10 09 Onion-B. Aman 3600 0.34 2 10 Garlic-B. Aman 2200 0.34 2 12 Potato-Boro-Aus-T. Aman 2200 0.31 3 15 Wheat-Vegetab-Vegetab-Vegetab 2000 0.31 3 16 Vegetab-Aus-Fallow 2060 0.31 3 17 Orion-Aus-T. Aman 1900 0.27 6 20 Vegetab-Fallow-T. Aman 1660 0.25 6 21 Vegetab-Fallow-T. Aman 1670 0.27 6 20 Potato-Mas-T. Aman 1660 0.25 10 21 Vegetab-Fallow 1240 0.19 7 2 Vegetab-Fallow-T. Aman 1200	03 Onion-Jute-Fallow	10080	1.51	5
68 Vegetab-Boro-T. Aman 4760 0.71 7 68 Chilli-Jute-Fallow 4620 0.69 10 70 Boro-Vegetab/Float/Norm**) 4000 0.60 6 08 Vegetab-Vegetab-Fallow 3730 0.55 7 10 Garlic-B. Aman 3100 0.46 4 11 Onion-Vegetab-Vegetab 3100 0.46 14 12 Chilli-Jute-T. Aman 2200 0.33 2 14 Otion-Sesame-T. Aman 2200 0.33 2 15 Wheat-Vegetab-Vegetab 2100 0.31 3 16 Vegetab-Aus-Fallow 2060 0.31 5 17 Onion-Aus-T. Aman 1910 0.29 3 18 Onion-Sesame-B. Aman 1800 0.27 2 19 Vegetab-Fallow 1660 0.25 6 21 Vegetab-Fallow-T. Aman 1660 0.25 10 22 1 24 Potato-Palew-Fallow 120 0.18 4 22 Potato-Maize-Vegeta	04 Onion-Iute-T. Aman	9330	1.40	12
Oc Chills - Juce - Fallow 4220 0.69 10 00 Doro-Vegetab(Float/Norm**) 4000 0.60 6 08 Vegetab-Vegetab-Fallow 3730 0.56 10 09 Onion-B. Aman 3650 0.55 7 10 Garlie-B. Aman 3100 0.46 4 11 Onion-Vegtab-Vegetab 3100 0.46 4 12 Chilli-Jute-T. Aman 2200 0.33 2 13 Potato-Boro-Aus-T. Aman 2200 0.31 3 14 Onion-Sesame-T. Aman 1910 0.29 3 15 Orion-Sesame-F. Aman 1800 0.27 6 20 Potato-Vegetab-Fallow 1650 0.25 5 21 Vegetab-Fallow 1650 0.25 6 22 Chilli-Vegetab-Fallow 1240 0.19 7 24 Potato-Jute-T. Aman 1200 0.18 4 27 Potato-Maize-T. Aman 1200	05 Vegetab-Boro-T. Aman	4760	0.71	7
07 Boro-Vegetab/Float/Norm**) 4000 0.60 6 08 Vegetab-Vegetab-Fallow 3730 0.55 7 10 Carlic-B. Aman 3100 0.46 4 11 Onion-Vegetab-Vegetab 3100 0.46 14 12 Chilli-Jute-T. Aman 2200 0.33 2 13 Potato-Boro-Aus-T. Aman 2200 0.33 2 14 Onion-Sesame-T. Aman 2200 0.31 3 16 Vegetab-Aus-Fallow 2060 0.31 5 17 Onion-Sesame-H. Aman 1800 0.27 2 19 Vegetab-Aus-Fallow 1665 0.25 6 20 Potato-Vegetab-Fallow 1650 0.25 10 21 Vegetab-Fallow 1260 0.12 11 24 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Maize-Vegetab 1000 0.15 4 25 Vegetab-Jute-Fallow 1200 <td>06 Chilli-Jute-Fallow</td> <td>4620</td> <td>0.69</td> <td>10</td>	06 Chilli-Jute-Fallow	4620	0.69	10
Description Description Stress Description 08 Vegetab-Vegetab-Fallow 3730 0.55 10 09 Onion-B. Aman 3650 0.55 7 10 Gartic-B. Aman 3100 0.46 4 11 Onion-Vegtab-Vegetab 3100 0.46 4 12 Chill-Jute-T. Aman 2200 0.33 2 14 Onion-Sesame-T. Aman 2200 0.31 3 16 Vegetab-Aus-Fallow 2060 0.31 3 16 Vegetab-Aus-Fallow 2060 0.31 3 16 Vegetab-Aus-Fallow 2060 0.27 6 20 Potato-Vegetab-T. Aman 1670 0.25 5 17 Vegetab-Fallow 1650 0.25 10 22 Chill-Vegetab-Fallow 1500 0.22 1 24 Potato-Vegetab-T. Aman 1030 0.15 4 24 Potato-Vegetab-T. Aman 1030 0.15	07 Boro-Vegetab(Float/Norm**)	4000	0.60	6
B Control Disc. Control Disc. Control Disc. Control Disc. Control Disc. Disc. <thdisc.< th=""> Disc. Disc.</thdisc.<>	08 Vegetab-Vegetab-Fallow	3730	0.56	10
Octool Control 2000 0.46 4 11 Orion-Vegtab-Vegetab 3100 0.46 14 12 Chill-Jute-T. Aman 2250 0.34 2 13 Potato-Boro-Aus-T. Aman 2200 0.33 2 14 Onion-Sesame-T. Aman 2200 0.33 2 15 Wheat-Vegetab-Vegetab 2100 0.31 3 16 Vegetab-Aus-Fallow 2060 0.31 5 17 Onion-Aus-T. Aman 1910 0.29 3 18 Onion-Sesamert B. Aman 1800 0.27 2 19 Vegetab-Fallow-T. Aman 1665 0.25 6 20 Potato-Vegetab-Fallow 1650 0.25 10 21 Potato-Maize-T. Aman 1260 0.19 7 24 Potato-Jute-F. Aman 1200 0.18 4 21 Potato-Maize-T. Aman 1000 0.15 2 22 Oritit-Chalze-Fallow 1200 0.18 4 24 Potato-Maize-T. Aman 1000 0.15 2 23 Vegetab-Tute-Fallow 1000 0.15 3 24 Cotatic-Ause-T. Aman 1000 0.15 <td>09 Onion-B Aman</td> <td>3650</td> <td>0.55</td> <td>7</td>	09 Onion-B Aman	3650	0.55	7
11 Orion-Vegtab-Vegetab 3100 0.46 14 12 Chilli-Jute-T. Aman 2300 0.34 2 13 Potato-Boro-Aus-T. Aman 2200 0.33 2 14 Onion-SesameT. Aman 2200 0.31 3 15 Wheat-Vegetab-Vegetab 2100 0.31 3 16 Vegetab-Aus-Fallow 2060 0.31 5 17 Orion-Aus-T. Aman 1910 0.29 3 18 Onion-Sesamet B. Aman 1800 0.27 2 19 Vegetab-Fallow-T. Aman 1665 0.25 6 20 Potato-Vegetab-T. Aman 1665 0.25 6 21 Potato-Maize-Vegetab 1500 0.22 1 21 Potato-Maize-Vegetab 1500 0.22 1 22 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Jute-T. Aman 1200 0.18 4 27 Vegetab-Jute-Fallow 1210 0.18 4 28 Vegetab-Vegetab-T. Aman 1000 0.15 1 20 Vegetab-Jute-T. Aman 1000 0.15 3 3 30 Votato-Boro-Fallow 70	10 Carlic-B Aman	3100	0.66	4
12 Chilli-Jute-T. Aman 200 0.34 2 13 Potato-Boro-Aus-T. Aman 2250 0.34 2 14 Onion-Sesame-T. Aman 2200 0.33 2 15 Wheat-Vegetab-Vegetab 2100 0.31 3 16 Vegetab-Aus-Fallow 2060 0.31 5 17 Onion-Aus-T. Aman 1910 0.29 3 18 Onion-Sesame+B. Aman 1800 0.27 2 19 Vegetab-Tallow-T. Aman 1670 0.25 5 21 Vegetab-Fallow-T. Aman 1665 0.25 10 22 Potato-Vegetab-Tallow 1500 0.22 1 24 Potato-Jute-T. Aman 1280 0.19 7 25 Vegetab-Jute-T. Aman 1200 0.18 4 27 Potato-Maize-T. Aman 1000 0.15 1 28 Vegetab-Jute-T. Aman 1000 0.15 1 29 Vegetab-Tallow 1000 0.15 1 20 Vegetab-Tallow 700 0.	11 Onion-Vegtab-Vegetab	3100	0.46	14
13 Potato-Boro-Aus-T. Aman 2200 0.34 2 14 Onion-Sesame-T. Aman 2200 0.33 2 15 Wheat-Vegetab-Vegetab 2100 0.31 3 16 Vegetab-Aus-Fallow 2060 0.31 3 17 Onion-Aus-T. Aman 1910 0.29 3 18 Onion-Sesame+B. Aman 1800 0.27 2 19 Vegetab-Fallow-T. Aman 170 0.25 5 21 Vegetab-Fallow-T. Aman 1665 0.25 6 22 Chill-Vegetab-Tallow 1650 0.22 1 24 Potato-Maize-Vegetab 1500 0.22 1 25 Vegetab-Jute-Fallow 1240 0.19 4 26 Chilli-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1030 0.15 1 26 Garlic-Aus-T. Aman 1000 0.15 1 1 27 Potato-Maize-T. Aman 1000 0.15 1 1 29 Vegetab-Jute-T. A	12 Chilli-Jute-T Aman	2300	0.40	11
15 Dialo Dialo F.A. Aman 2200 0.33 2 14 Onion-Sesame-T. Aman 200 0.31 3 15 Wheat-Vegetab-Ause-Fallow 2060 0.31 5 17 Onion-Ause-T. Aman 1910 0.29 3 18 Onion-Sesame+B. Aman 1900 0.27 6 20 Potato-Vegetab-T. Aman 1790 0.27 6 20 Potato-Vegetab-T. Aman 1665 0.25 5 21 Vegetab-Fallow 1650 0.25 10 22 Potato-Vegetab Taman 1280 0.19 7 24 Potato-Jute-T. Aman 1200 0.18 4 4 26 Chill-Aus-Fallow 1210 0.18 4 4 2 Garlic-Ause-T. Aman 1000 0.15 1 29 Vegetab-Jute-Fallow 1010 0.15 1 3 2 Garlic-Ause-T. Aman 1000 0.15 1 20 Vegetab-T. Aman	13 Potato-Boro-Aus-T Aman	2300	0.34	2
In Onton-Sesame T. Aman 2000 0.31 3 16 Vegetab-Vegetab 2000 0.31 3 17 Onion-Sesame+B. Aman 1910 0.29 3 18 Onion-Sesame+B. Aman 1900 0.27 2 19 Vegetab-Fallow-T. Aman 1700 0.27 6 20 Potato-Vegetab-T. Aman 1650 0.25 5 21 Vegetab-Aus-T. Aman 1665 0.25 6 22 Chilli-Vegetab-T. Aman 1665 0.22 1 24 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Maize-Vegetab 1200 0.18 4 25 Vegetab-Jute-T. Aman 1200 0.18 4 26 Chilli-Aus-Fallow 1010 0.15 1 27 Potato-Maize-T. Aman 1000 0.15 1 29 Cartic-Aus-T. Aman 1000 0.15 3 20 Vegetab-Fallow 750	14 Opion-Second-T Amon	2200	0.34	2
1b Wited=Vegetab-Vegetab 2100 0.31 5 16 Vegetab-Ta.Heallow 2060 0.31 5 17 Onion-Aus-T. Aman 1910 0.29 3 18 Onion-Sesame+B. Aman 1800 0.27 2 19 Vegetab-Fallow-T. Aman 1665 0.25 6 21 Vegetab-Laus-T. Aman 1665 0.25 10 23 Potato-Maizz-Vegetab 1500 0.22 1 24 Potato-Jute-T. Aman 1280 0.19 7 25 Vegetab-Jute-Fallow 1240 0.19 4 26 Chilli-Aus-Fallow 1210 0.18 4 27 Potato-Maizz-T. Aman 1030 0.15 1 29 Gartic-Aus-T. Aman 1010 0.15 2 30 Vegetab-Tallow 900 0.15 1 31 Vegetab-Tallow-TAman 900 0.15 3 32 Vegetab-Tallow-Fallow 900 0.13 3 33 Potato-Maizz-Aus-T. Aman 700 0.11	14 Onion-Sesame-1. Anian 15 Wheet Vegetah Vegetah	2200	0.33	2
In O Vegetab-TAUS-Failow 2000 0.51 5 17 Onion-Aus-T. Aman 1910 0.29 3 18 Onion-Sesame+B. Aman 1800 0.27 2 19 Vegetab-Fallow-T. Aman 1670 0.25 5 20 Potato-Vegetab-T. Aman 1665 0.25 6 21 Vegetab-Aus-T. Aman 1665 0.25 10 22 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Maize-Vegetab 1500 0.22 1 25 Vegetab-Jute-Tallow 1240 0.19 4 26 Chilli-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1000 0.15 1 29 Gartic-Aus-T. Aman 1000 0.15 3 29 Gartic-Aus-T. Aman 980 0.15 3 30 Vegetab-Jute-T. Aman 900 0.13 3 31 Vegetab-Megetab 700 <	16 Waastah Assa Fallana	2100	0.51	5
11 Onton-Ause-1. Aman 1910 0.29 3 18 Onton-Sesame+B. Aman 1800 0.27 6 19 Vegetab-Fallow-T. Aman 1670 0.25 5 20 Potato-Vegetab-T. Aman 1665 0.25 6 22 Chilli-Vegetab-Aus-T. Aman 1660 0.22 1 24 Potato-Jute-T. Aman 1280 0.19 7 25 Vegetab-Jute-T. Aman 1280 0.19 7 24 Potato-Maize-Vegetab 1200 0.18 4 27 Potato-Maize-T. Aman 1200 0.18 4 28 Vegetab-Teallow 1210 0.18 4 29 Carlic-Aus-T. Aman 1010 0.15 2 30 Vegetab-Tice-T. Aman 1000 0.15 1 31 Vegetab-Tallow 900 0.13 3 32 Vegetab-Tallow 750 0.11 3 33 Potato-Boro-Fallow 710 0.11 4 34 Ontion-Aus 700 0.10 <td< td=""><td>16 vegetab-Aus-Fallow</td><td>2060</td><td>0.51</td><td>5</td></td<>	16 vegetab-Aus-Fallow	2060	0.51	5
Ib Onton-Sesame+B. Aman 1800 0.27 2 19 Vegetab-Fallow 1670 0.25 5 20 Potato-Vegetab-T. Aman 1660 0.25 5 21 Vegetab-Fallow 1650 0.25 6 22 Chill-Vegetab-Fallow 1650 0.22 1 24 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Jute-T. Aman 1240 0.19 4 25 Vegetab-Jute-Fallow 1240 0.19 4 26 Chill-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1030 0.15 4 28 Vegetab-T. Aman 1000 0.15 1 29 Garlic-Aus-T. Aman 1000 0.15 3 30 Vegetab-Fallow 900 0.13 3 31 Vegetab-Fallow 700 0.11 3 32 Vegetab-Fallow 710 0.11 3 <td>17 Onion-Aus-1. Aman</td> <td>1910</td> <td>0.29</td> <td>3</td>	17 Onion-Aus-1. Aman	1910	0.29	3
19 Vegetab-T. Aman 1790 0.27 6 20 Potato-Vegetab-T. Aman 1665 0.25 5 21 Vegetab-Aus-T. Aman 1665 0.25 10 23 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Jute-F. Aman 1280 0.19 7 25 Vegetab-Jute-Fallow 1240 0.19 4 26 Chili-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1030 0.15 4 28 Vegetab-Vegetab-T. Aman 1030 0.15 2 29 Gartic-Aus-T. Aman 1030 0.15 1 20 Vegetab-Chilow-Fallow 900 0.13 3 30 Vegetab-Fallow-Fallow 900 0.13 3 31 Vegetab-Fallow-Fallow 900 0.11 3 32 Vegetab-Fallow-Fallow 700 0.11 4 34 Onion-Aus-Blackgram 740 0.11 4 35 Chili-Fallow-Fallow 630 0.0	18 Onion-Sesame+B. Aman	1800	0.27	2
20 Potato-Vegetab-T. Aman 1670 0.25 5 21 Vegetab-Aus-T. Aman 1665 0.25 10 23 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Maize-Vegetab 1200 0.19 7 25 Vegetab-Jute-Fallow 1240 0.19 4 26 Chilli-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1030 0.15 4 28 Vegetab-Vegetab-T. Aman 1010 0.15 2 30 Vegetab-Jute-T. Aman 1000 0.15 1 31 Vegetab-Jute-T. Aman 1000 0.15 3 32 Vegetab-Fallow-Fallow 900 0.13 3 33 Potato-Boro-Fallow 750 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 630 0.09 2 36 Garlic-Jute-Fallow 630 0.09 2 37 Otato-Sesame-T. Aman 600	19 Vegetab–Fallow–T. Aman	1790	0.27	6
21 Vegetab-Jus-T. Aman 1665 0.25 6 22 Chilli-Vegetab-Fallow 1650 0.25 10 23 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Jute-T. Aman 1280 0.19 7 25 Vegetab-Jute-Fallow 1240 0.18 4 26 Chilli-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1030 0.15 4 26 Gartic-Aus-T. Aman 1030 0.15 1 27 Potato-Maize-T. Aman 1000 0.15 1 28 Vegetab-Onion-Aus 1000 0.15 1 30 Vegetab-Fallow-Fallow 900 0.13 3 31 Vegetab-Fallow 710 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chili-Fallow 710 0.11 4 36 Gartic-Jute-T. Aman 600 0.09 2 38 Potato-Seame-T. Aman 400 0.06 2	20 Potato-Vegetab-T. Aman	1670	0.25	5
22 Chili-Vegetab-Fallow 1650 0.25 10 23 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Jute-T. Aman 1280 0.19 7 25 Vegetab-Jute-Fallow 1240 0.19 4 26 Chilli-Aus-Fallow 1210 0.18 4 27 Otato-Maize-T. Aman 1030 0.15 4 28 Vegetab-Vegetab-T. Aman 1010 0.15 1 30 Vegetab-Conon-Aus 1000 0.15 1 31 Vegetab-Tallow-Fallow 900 0.13 3 32 Vegetab-Tallow-Fallow 900 0.11 3 33 Potato-Boro-Fallow 700 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 630 0.09 2 38 Potato-Boro-Fallow 630 0.09 2 39 Chilli-Fallow-Tallow 700 0.11 6 30 Coriander-Vegetab-Fallow 630 0.0	21 Vegetab–Aus–T. Aman	1665	0.25	6
23 Potato-Maize-Vegetab 1500 0.22 1 24 Potato-Jute-T. Aman 1280 0.19 7 25 Vegetab-Jute-Fallow 1210 0.18 4 26 Chilli-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1030 0.15 4 29 Garlic-Aus-T. Aman 1010 0.15 2 30 Vegetab-Conion-Aus 1000 0.15 1 31 Vegetab-Fallow-Fallow 900 0.13 3 32 Vegetab-Fallow-Fallow 900 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Fallow-Fallow 630 0.06 2 40 Garlic-Jute-T. Aman 420 0.06 2 39 Chilli-Fallow-T. Aman 420 0.06 2 40 Garlic-Jute-Fallow 350 0.05	22 Chilli–Vegetab–Fallow	1650	0.25	10
24 Potato-Jute-T. Aman 1280 0.19 7 25 Vegetab-Jute-Fallow 1240 0.19 4 26 Chilli-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1000 0.15 4 28 Vegetab-Vegetab-T. Aman 1010 0.15 2 30 Vegetab-Donion-Aus 1000 0.15 1 31 Vegetab-Jute-T. Aman 980 0.15 3 32 Vegetab-Jallow-Fallow 900 0.13 3 33 Potato-Boro-Fallow 750 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 630 0.09 2 36 Garlic-Jute-T. Aman 700 0.10 6 37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Seame-T. Aman 400 0.06 2 40 Carlic-Jute-Fallow 430 0.06 2 41 Garlic-Fallow-T. Aman 420 0.06<	23 Potato-Maize-Vegetab	1500	0.22	1
25 Vegetab-Jute-Fallow 1240 0.19 4 26 Chilli-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1030 0.15 4 28 Vegetab-Vegetab-T. Aman 1010 0.15 2 30 Vegetab-Onion-Aus 1000 0.15 1 31 Vegetab-Jute-T. Aman 980 0.15 3 32 Vegetab-Fallow-Fallow 900 0.13 3 33 Potato-Boro-Fallow 750 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 710 0.11 4 36 Garlic-Jute-T. Aman 700 0.00 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 420 0.06 5 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 300 0.04	24 Potato–Jute–T. Aman	1280	0.19	7
26 Chilli-Aus-Fallow 1210 0.18 4 27 Potato-Maize-T. Aman 1200 0.18 4 28 Vegetab-T. Aman 1030 0.15 4 29 Garlic-Aus-T. Aman 1010 0.15 2 30 Vegetab-Onion-Aus 1000 0.15 1 31 Vegetab-Jute-T. Aman 980 0.15 3 32 Vegetab-Fallow-Fallow 900 0.13 3 33 Potato-Boro-Fallow 750 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chili-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Here-Fallow 380 0.06 1 43 Onion-Sesame-Fallow 380 0.06 2 44 Garlic-Vegetab 300 0.04 1	25 Vegetab–Jute–Fallow	1240	0.19	4
27 Potato-Maize-T. Aman 1200 0.18 4 28 Vegetab-Vegetab-T. Aman 1030 0.15 4 29 Garlic-Aus-T. Aman 1010 0.15 2 30 Vegetab-Onion-Aus 1000 0.15 1 31 Vegetab-Jute-T. Aman 980 0.15 3 32 Vegetab-Fallow-Fallow 900 0.13 3 33 Potato-Boro-Fallow 750 0.11 3 34 Onion-Aus-Blackgram 740 0.11 4 36 Garlic-Jute-T. Aman 700 0.10 6 37 Otato-Boro-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 38 Potato-Sesame-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Jute-Fallow 350 0.05 2 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05	26 Chilli–Aus–Fallow	1210	0.18	4
28 Vegetab-Vegetab-T. Aman 1030 0.15 4 29 Garlic-Aus-T. Aman 1010 0.15 2 30 Vegetab-Onion-Aus 1000 0.15 1 31 Vegetab-Jute-T. Aman 980 0.15 3 32 Vegetab-Fallow-Fallow 900 0.13 3 33 Potato-Boro-Fallow 750 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 700 0.10 6 36 Carlic-Jute-T. Aman 700 0.10 6 37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 360 0.05 2 44 Garlic-Vegetab-Vegetab 300 0.04<	27 Potato-Maize-T. Aman	1200	0.18	4
29 Garlic-Aus-T. Aman 1010 0.15 2 30 Vegetab-Onion-Aus 1000 0.15 1 31 Vegetab-Jute-T. Aman 980 0.15 3 32 Vegetab-Fallow-Fallow 900 0.13 3 33 Potato-Boro-Fallow 970 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 630 0.09 2 36 Garlic-Jute-T. Aman 700 0.10 6 37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Fullow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab 300 0.04 1 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 <td>28 Vegetab-Vegetab-T. Aman</td> <td>1030</td> <td>0.15</td> <td>4</td>	28 Vegetab-Vegetab-T. Aman	1030	0.15	4
30 Vegetab-Onion-Aus 1000 0.15 1 31 Vegetab-Jute-T. Aman 980 0.15 3 32 Vegetab-Fallow-Fallow 900 0.13 3 33 Potato-Boro-Fallow 750 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 710 0.11 4 36 Garlic-Jute-T. Aman 700 0.10 6 37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Jute-Fallow-T. Aman 420 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab 300 0.04 1 45 Potato-Boro-Vegetab 300 0.04	29 Garlic-Aus-T. Aman	1010	0.15	2
31 Vegetab-Jute-T. Aman 980 0.15 3 32 Vegetab-Fallow-Fallow 900 0.13 3 33 Potato-Boro-Fallow 750 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 710 0.11 4 36 Garlic-Jute-T. Aman 700 0.10 6 37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Jute-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Fuelow-Vegetab 300 0.04 1 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 <td>30 Vegetab-Onion-Aus</td> <td>1000</td> <td>0.15</td> <td>1</td>	30 Vegetab-Onion-Aus	1000	0.15	1
32Vegetab-Fallow-Fallow9000.13333Potato-Boro-Fallow7500.11334Onion-Aus-Blackgram7400.11335Chilli-Fallow-Fallow7100.11436Garlic-Jute-T. Aman7000.10637Coriander-Vegetab-Fallow6300.09238Potato-Sesame-T. Aman6000.09239Chilli-Aus-T. Aman4300.06240Garlic-Jute-Fallow4300.06241Garlic-Jute-Vegetab3800.06143Onion-Sesame-Fallow3500.05244Garlic-Vegetab3450.05945Potato-Beror-Vegetab3450.05945Potato-Maize-Aus3000.04146Potato-Maize-Aus-Vegetab3000.04147Potato-Maize-Aus-Vegetab3000.04148Vegetab-Boro-Jute3000.04149Pea-Aus-Vegetab2700.04551Boro-Vegetab-T. Aman2000.03252Potato-Fallow-T. Aman2000.03153Vegetab-T. Aman2000.03354Potato-Maize-Aus-Vegetab2700.04551Boro-Vegetab-T. Aman2000.03154Vegetab-Fallow-Blackgram2000.03354Other 25 pat	31 Vegetab–Jute–T. Aman	980	0.15	3
33 Potato-Boro-Fallow 750 0.11 3 34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 710 0.11 4 36 Garlic-Jute-T. Aman 700 0.10 6 37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab 300 0.04 1 43 Onion-Sesame-Fallow 300 0.04 1 44 Garlic-Vegetab 300 0.04 1 45 Potato-Maize-Aus 280 0.04 1 46 Potato-Maize-Aus-Vegetab 270 0.04 2 </td <td>32 Vegetab-Fallow-Fallow</td> <td>900</td> <td>0.13</td> <td>3</td>	32 Vegetab-Fallow-Fallow	900	0.13	3
34 Onion-Aus-Blackgram 740 0.11 3 35 Chilli-Fallow-Fallow 710 0.11 4 36 Garlic-Jute-T. Aman 700 0.10 6 37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Jute-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 345 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 1 48 Vegetab-Jou-Vegetab 280 0.04 </td <td>33 Potato-Boro-Fallow</td> <td>750</td> <td>0.11</td> <td>3</td>	33 Potato-Boro-Fallow	750	0.11	3
35 Chilli-Fallow-Fallow 710 0.11 4 36 Garlic-Jute-T. Aman 700 0.10 6 37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Jute-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 345 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Soro-Jute 300 0.04 1 49 Pea-Aus-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03	34 Onion-Aus-Blackgram	740	0.11	3
36 Garlic-Jute-T. Aman 700 0.10 6 37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Jute-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 345 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0	35 Chilli-Fallow-Fallow	710	0.11	4
37 Coriander-Vegetab-Fallow 630 0.09 2 38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Jute-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 345 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 1 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.	36 Garlic-Jute-T. Aman	700	0.10	6
38 Potato-Sesame-T. Aman 600 0.09 2 39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Jute-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 345 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 1 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 3 53 Vegetab-Fallow-Blackgram 200 0.03<	37 Coriander-Vegetab-Fallow	630	0.09	2
39 Chilli-Aus-T. Aman 430 0.06 2 40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Jute-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 345 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 1 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 3 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485	38 Potato-Sesame-T. Aman	600	0.09	2
40 Garlic-Jute-Fallow 430 0.06 2 41 Garlic-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 345 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 2 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 3 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 <t< td=""><td>39 Chilli-Aus-T. Aman</td><td>430</td><td>0.06</td><td>2</td></t<>	39 Chilli-Aus-T. Aman	430	0.06	2
41 Garlic-Fallow-T. Aman 420 0.06 5 42 Vegetab-Jute-Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 350 0.05 2 44 Garlic-Vegetab-Vegetab 350 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 1 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 3 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	40 Garlic-Inte-Fallow	430	0.06	2
42 Vegetab - Jute - Vegetab 380 0.06 1 43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 345 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 1 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 3 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	41 Garlic-Fallow-T Aman	420	0.06	- 5
43 Onion-Sesame-Fallow 350 0.05 2 44 Garlic-Vegetab-Vegetab 350 0.05 9 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 2 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 3 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	42 Vegetah-Jute-Vegetah	380	0.06	1
43 Garlic - Vegetab - Vegetab 345 0.05 2 44 Garlic - Vegetab - Vegetab 345 0.05 9 45 Potato - Boro - Vegetab 300 0.04 1 46 Potato - Maize - Aus 300 0.04 1 47 Potato - Maize - Aus - Vegetab 300 0.04 1 48 Vegetab - Boro - Jute 300 0.04 2 49 Pea - Aus - Vegetab 280 0.04 1 50 Lentil - Vegetab - Vegetab 270 0.04 5 51 Boro - Vegetab - T. Aman 200 0.03 2 52 Potato - Fallow - T. Aman 200 0.03 3 53 Vegetab - Fallow - Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	43 Onion-Sesame-Fallow	350	0.05	2
41 Guille Vegetab 340 540 540 45 Potato-Boro-Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 2 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 3 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	44 Carlic-Vegetah-Vegetah	345	0.05	9
40 Fortato Forto Vegetab 300 0.04 1 46 Potato-Maize-Aus 300 0.04 1 47 Potato-Maize-Aus-Vegetab 300 0.04 1 48 Vegetab-Boro-Jute 300 0.04 2 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 3 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	45 Potato-Boro-Vegetab	300	0.00	1
40 Fotato 500 0.04 1 47 Potato Maize Aus 1 48 Vegetab 300 0.04 1 49 Pea-Aus-Vegetab 300 0.04 2 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 1 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	46 Potato-Maizo-Aus	300	0.04	1
47 Fourier Marze Aus Vegetab 500 0.04 1 48 Vegetab-Boro-Jute 300 0.04 2 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 1 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	47 Potato-Maize-Aus-Vagatah	300	0.04	± 1
40 Vegetab 500 0.04 2 49 Pea-Aus-Vegetab 280 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 1 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	48 Vagatab-Bara-Juta	200	0.04	1
49 1200 0.04 1 50 Lentil-Vegetab-Vegetab 270 0.04 5 51 Boro-Vegetab-T. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 1 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	$40 \text{ Poz} = \Lambda_{115} = \text{Vagatab}$	200	0.04	ے 1
50 Lentin - vegetab	50 I optil-Wagatah-Wagatah	200	0.04	1
51 b0r0-vegetab-1. Aman 200 0.03 2 52 Potato-Fallow-T. Aman 200 0.03 1 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	50 Lenui vegetab vegetab	2/0	0.04	5
52 Forato-Fallow-1. Aman 200 0.03 1 53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	51 DORO-VEGETAD-1. AMAN	200	0.03	2
53 Vegetab-Fallow-Blackgram 200 0.03 3 54-78 Other 25 patterns (in Table 9) 1485 0.22 -	52 POtato-Fallow-1. Aman	200	0.03	1
<u>54-78 Otner 25 patterns (in Table 9)</u> <u>1485</u> <u>0.22</u> -	55 vegetab=Fallow=Blackgram	200	0.03	3
404055 80.00	54-76 Otner 25 patterns (in Table 9)	1485	0.22	-

Table 9.	Rare cropping patterns	covering	non-significant	area in Bogr	a region, 2014-15.
I ubic Ji	rune cropping putterns	covering	non orginicant	area in Dogi	a region, aori 10.

	Cropping pattern	Area (ha)	% of NCA	Frequency	Upazila
01	Mustard-Maize-T. Aman	190	0.03	1	Sherpur
02	Potato-Aus-T. Aman	180	0.03	2	Shahjahanpur+Pabna sadar
03	Blackgram–Jute–Fallow	170	0.03	2	Sonatola+Kazipur
04	Millet(cheena)–Jute–Fallow	170	0.03	1	Sariakandi
05	Vegetab-Boro-Fallow	170	0.03	1	Chowhali
06	Grasspea–B.Aus+B. Aman	160	0.02	2	Kazipur+Sirajganj sadar
07	Coriander-Fallow-Fallow	150	0.02	2	Bhangura+Chowhali
08	S.Potato-Fallow-T. Aman	115	0.02	3	Kalai+Khetlal+Kazipara
09	Wheat-Mungbean-Fallow	105	0.02	2	Pabna sadar+Tarash
10	Lentil-Mungbean-T. Aman	100	0.02	1	Pabna sadar
11	Maize–Aus–T. Aman	100	0.02	2	Shajahanpur+Pabna sadar
12	Mustard-Boro-Jute-T. Aman	100	0.02	1	Sonatola
13	Potato-Boro-Jute-T. Aman	90	0.01	1	Sherpur
14	Onion–Fallow–T. Aman	80	0.01	2	Dubchachia+Khetlal
15	Pea-Fallow-T. Aman	80	0.01	1	Chowhali
16	Vegetab-Maize-T. Aman	80	0.01	2	Shajahanpur+Tarash
17	Maize–Vegetab–T. Aman	70	0.01	1	Shajahanpur
18	Onion-Aus-Fallow	70	0.01	2	Adamdighi+Kazipur
19	Onion-Maize-T. Aman	70	0.01	1	Sherpur
20	Potato-S.gourd-Aus	70	0.01	2	Gabtali+Akkelpur
21	Garlic-Fallow-Fallow	60	0.01	1	Dhunat
22	Coriander-Sesame-T. Aman	55	0.01	2	Pabna+Tarash
23	Blackgram–Aus–T. Aman	50	0.01	1	Sherpur
24	S.Potato-Vegetab-Fallow	50	0.01	1	Bogra sadar
25	Blackcumin-Jute-Fallow	40	0.01	1	Chowhali
26	Chilli-Vegetab-T. Aman	40	0.01	1	Dubchachia
27	Grasspea-Aus-T. Aman	40	0.01	1	Atghoria
28	Maize-Maize-Fallow	40	0.01	1	Shajahanpur
29	Muskmelon-Fallow-Fallow	40	0.01	1	Siraigani sadar
30	Chilli–B. Aman	30	0.00	1	Bera
31	Coriander-Iute-Fallow	30	0.00	1	Kazipur
32	Garlic-Aus-Fallow	30	0.00	1	Adamdighi
33	Maize-Sesame-Fallow	30	0.00	1	Tarash
34	Potato+S.gourd-Aus-T. Aman	30	0.00	1	Sonatola
35	W.Melon-B. Aman	30	0.00	1	Tarash
36	Blackcumin–Iute–T. Aman	20	0.00	1	Kazipur
37	Maize-Vegetab-Fallow	20	0.00	1	Shibgani
38	Potato-Maize-Fallow	20	0.00	1	Siraigani sadar
39	Barley-Fallow-Fallow	15	0.00	2	Chowhali+Tarash
40	Chilli-Fallow-T Aman	10	0.00	-	Kalai
41	Fallow-Sesame-T Aman	10	0.00	1	Sherpur
42	Millet(<i>cheeng</i>)–Fallow–Fallow	10	0.00	1	Sonatola
43	Potato-Onion-T Aman	10	0.00	1	Khetlal
44	Wheat-Vegetab-T Aman	10	0.00	1	Khetlal
45	S.Potato-Jute-T. Aman		0.00	1	Akkelpur
	Total	3045	0.46	÷	· · · · · · · · · · · · · · · · · · ·

Sesame+B. Aman is grown on 1,700 hectares in Chowhali upazila of the same district. Millet (*kaon*)–Fallow–T. Aman is cultivated on 1,500 hectares only in Sariakandi of Bogra district. The millet is a small grain cereal crop, which stands on the bank of extinction for its low yield and less economic value, although it is a very nutritious food. Only some marginal land like *charland* is used for its cultivation (FAO, 1988).

Rare cropping patterns

In the present investigation, 45 cropping patterns have been identified as rare cropping patterns with negligible area coverage with seldom existence (Table 9). These are location specific system and are limited in one or two upazilas of the region. Total area coverage of the 45 patterns is far less than 1% of NC Among them the highest area was allotted for Mustard-Maize-T. Aman (190 ha) and it is recorded only in Sherpur upazila of Bogra district. The smallest area was recorded for S.Potato-Jute-T. Aman cropping patterns whose coverage was only five hectares (Table 9) and is recorded only in Akkelpur upazila of Joypurhat district.

Most dominant cropping pattern

Boro-Fallow-T. Aman was the most dominant cropping pattern in Bogra region. It covers 21.88% of NCA in the region and is available in 27 upazilas out of 35 (Table 10). The highest area under this cropping was recorded 16,500 hectares in Raiganj upazila of Sirajganj district which represents 11.28% of the total Boro-Fallow-T. Aman area of the region. In consideration of indivdual upazila it also covered the highest area and it is 77.10% of its NCA for this pattern alone. Chatmohar and Bhangura upazila of Pabna district had negligible area coverage for this pattern. In some portion of the double rice area some short duration Rabi crops can be grown before Boro transplanting if appropriate varieties and other related technologies are made available (FAO, 1988). In the country-wide compilation of data it was observed that Boro-F-T. Aman was the most dominant cropping pattern in Bangladesh covering 2.31 million ha (27% of NCA in the country) with its distribution in 426 upazilas of 63 districts (Nasim et al., 2017).

Second dominant cropping pattern

The second dominant cropping pattern in Bogra region is Potato–Boro–T. Aman. It belongs to 13.26% of NCA of the region and spread over 17 upazilas (Table 11). Shibganj upazila of Bogra district holds the highest area coverage (18,200 ha) under this cropping pattern. Kalai upazila ranks in second position in terms of area coverage (11,800 ha) however this upazila allotted the biggest share (84.83%) of the upazila NCA. In the country-wide compilation of data it was observed that Potato–Boro–T. Aman was the 8th dominant cropping pattern in Bangladesh covering 1.80 lac ha (2.11% of NCA in the country) with its distribution in 115 upazilas of 33 districts (Nasim *et al.*, 2017).

Third dominant cropping pattern

Mustard-Boro-Fallow cropping pattern holds the third largest area coverage 50,940 hectares in Bogra region. This area is an equivalent to 7.62% of NCA in the region. This pattern Mustard-Boro–Fallow is distributed over only 15 upazilas. Shahjadpur and Ullapara upazila have the highest area coverage under this pattern and it is 13,000 ha for both the upazilas which stands for 25.52% of the total area under this pattern in the region for both the locations (Table 12). Belkuchi upazila ranks in third position for this cropping pattern, however, Panchbibi, Santhia and Kazipur covers a minute area of 200 ha for each upazila.

Fourth dominant cropping pattern

Fourth dominant cropping pattern Mustard– Boro–T. Aman has occupied 40,110 hectares representing 6.0% share of NCA in Bogra region (Table 13). This pattern is distributed over 25 upazilas where Kahalu ranked in top position. This upazila has 4,800 ha area of Mustard–Boro–T. Aman which is 24.96% of upazila NCA. Dupchachia upazila ranks in third position with 3,700 ha area for this pattern; however, this upazila has allotted the biggest share (26.94%) of its NCA.

Fifth dominant cropping pattern

Fifth dominant cropping pattern Boro-Fallow-Fallow had been covering 37,300 hectares

	Upazila	Area (ha)	% of upazila NCA	% of the pattern in region
01	Raiganj	16500	77.10	11.28
02	Sherpur	13600	57.14	9.30
03	Dhunat	13100	67.18	8.96
04	Gabtali	11500	60.37	7.86
05	Sirajganj sadar	9000	40.54	6.15
06	Tarash	8700	35.15	5.95
07	Nandigram	8000	35.87	5.47
08	Sariakandi	8000	32.92	5.47
09	Panchbibi	7900	35.75	5.40
10	Shajahanpur	6500	40.88	4.44
11	Joypurhat sadar	5700	30.65	3.90
12	Kahalu	4700	24.48	3.21
13	Sonatola	4700	34.31	3.21
14	Atghoria	4500	32.61	3.08
15	Adamdighi	4100	32.28	2.80
16	Akkelpur	3900	36.28	2.67
17	Kazipur	3200	14.16	2.19
18	Dubchachia	3000	21.90	2.05
19	Iswardi	2000	13.07	1.37
20	Bogra sadar	1800	16.29	1.23
21	Sujanagar	1800	7.38	1.23
22	Kalai	1400	10.07	0.96
23	Shibganj	1200	4.72	0.82
24	Kamarkhanda	800	10.53	0.55
25	Khetlal	300	2.58	0.21
26	Chatmohar	200	0.80	0.14
27	Bhangura	150	1.36	0.10
	Bogra region	146250	21.88	100.00

Table 10. Distribution of the most dominant Boro-F-T. Aman cropping patterns in Bogra region, 2014-15.

Table 11. Distribution of the 2nd dominant Potato-Boro–T. Aman cropping pattern in Bogra region, 2014-15.

	Upazila	Area (ha)	% of upazila NCA	% of the pattern in region
01	Shibganj	18200	75.99	20.54
02	Kalai	11800	84.83	13.32
03	Khetlal	8900	76.20	10.04
04	Kahalu	8600	44.72	9.71
05	Dubchachia	6600	48.05	7.45
06	Pachbibi	6100	26.90	6.88
07	Bogra sadar	6000	53.56	6.77
08	Joypurhat sadar	5500	28.35	6.21
09	Akkelpur	5000	46.12	5.64
10	Shajahanpur	4000	16.98	4.51
11	Adamdighi	3300	25.90	3.72
12	Sonatola	2300	16.61	2.60
13	Gabtali	1300	6.78	1.47
14	Sherpur	360	1.38	0.41
15	Ullapara	250	0.78	0.28
16	Kamarkhanda	200	2.59	0.23
17	Tarash	200	0.81	0.23
	Bogra region	88610	13.26	100.00

Table 12. Distribution of the 3rd dominant Mustard-Boro-Fallow	cropping pattern in	Bogra region, 2014-15.
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	Upazila	Area (ha)	% of upazila NCA	% of the pattern in region
01	Shahjadpur	13000	52.20	25.52
02	Ullapara	13000	40.51	25.52
03	Belkuchi	6000	46.33	11.78
04	Tarash	5100	20.60	10.01
05	Chatmohar	4000	15.96	7.85
06	Faridpur	4000	34.64	7.85
07	Bera	1400	7.80	2.75
08	Bhangura	1100	9.92	2.16
09	Raiganj	800	3.66	1.57
10	Gabtali	740	3.86	1.45
11	Sujanagar	700	2.84	1.37
12	Sirajganj	500	2.11	0.98
13	Panchbibi	200	0.88	0.39
14	Santhia	200	0.79	0.39
15	Kazipur	200	0.87	0.39
	Bogra region	50940	7.62	100.00

Table 13. Distribution of the 4 ^t	dominant Mustard-Boro	-T. Aman cropping pattern	in Bogra region, 2014-15.
rable 15. Distribution of the 4	dominant mustaru-Doro	1. Aman cropping pattern	1 III DOgia (Cgioli, 2014-15)

	Upazila	Area (ha)	% of upazila NCA	% of the pattern in region
1	Kahalu	4800	24.96	11.97
2	Panchbibi	4200	18.52	10.47
3	Dubchachia	3700	26.94	9.22
4	Ullapara	3700	11.53	9.22
5	Adamdighi	3200	25.12	7.98
6	Joypurhat	3000	15.46	7.48
7	Dhunat	2000	10.23	4.99
8	Kamarkhanda	2000	25.86	4.99
9	Sirajganj	1600	6.74	3.99
10	Khetlal	1400	11.99	3.49
11	Sonatola	1300	9.39	3.24
12	Shariakandi	1200	4.93	2.99
13	Sherpur	1100	4.67	2.74
14	Shibganj	1100	4.22	2.74
15	Akkelpur	1100	10.15	2.74
16	Belkuchi	1000	7.72	2.49
17	Raiganj	900	4.11	2.24
18	Bogra	800	7.14	1.99
19	Shajahanpur	600	3.74	1.50
20	Kazipur	350	1.53	0.87
21	Tarash	260	1.05	0.65
22	Kalai	200	1.44	0.50
23	Atghoria	200	1.43	0.50
24	Bhangura	200	1.80	0.50
25	Santhia	200	0.79	0.50
	Bogra region	40110	6.00	100.00

representing 5.58% share of NCA in Bogra region (Table 14). This pattern is distributed over 21 upazilas where Kazipur ranked in top position. This upazila had 7,600 ha area for single Boro pattern which is 33.17% of upazila NCA. Ullapara upazila ranked in second position in respect to area coverage. In the country-wide

compilation of data it was observed that the single Boro was the 2^{nd} dominant cropping pattern in Bangladesh covering 1.14 million ha (13% of NCA in the country) with its distribution in 342 upazilas of 59 districts (Nasim *et al.*, 2017). This pattern is frequent and concurrently experienced by early flash

	Upazila	Area (ha)	% of upazila NCA	% of the pattern in region
01	Kazipur	7600	33.17	20.38
02	Ullapara	5400	16.83	14.48
03	Tarash	3000	12.12	8.04
04	Chowhali	2400	18.88	6.43
05	Bhangura	2100	18.94	5.63
06	Sariakandi	2000	8.21	5.36
07	Sujanagar	1800	7.29	4.83
08	Shahjadpur	1800	7.23	4.83
09	Pabna	1500	4.21	4.02
10	Bera	1400	7.80	3.75
11	Gabtali	1200	6.26	3.22
12	Sherpur	1000	3.84	2.68
13	Chatmohar	1000	3.99	2.68
14	Faridpur	1000	8.66	2.68
15	Raiganj	1000	4.57	2.68
16	Atghoria	800	5.70	2.14
17	Shajahanpur	600	2.55	1.61
18	Sonatola	600	4.33	1.61
19	Kamarkhanda	500	6.46	1.34
20	Dhunat	400	2.05	1.07
21	Adamdighi	200	1.57	0.54
	Bogra region	37300	5.58	100.00

Table 14. Distribution of the 5th dominant Boro-F-F cropping pattern in Bogra region, 2014-15.

in April and cold injury at reproductive stage. Diversified cropping pattern may be resort for the farmer as a coping strategy with flood related risk (Mandal and Bezbaruah, 2013) but scope of diversification is limited due to environmental and climatic condition (FAO, 1988).

Crop diversity and cropping intensity

Higher number of available crops under cultivation in an area dictates its higher diversity. Number of cropping patterns is also a gross indicator of crop diversity. A total of 177 cropping patterns were identified in the whole area of Bogra region under this investigation. The highest number of cropping patterns was identified 36 in Kazipur upazila of Sirajganj district and that was 34 in Sonatola upazila in Bogra district (Table 15). The lowest number of cropping patterns was identified six in Nandigram followed by nine in Dubchachia and Kahalu upazila. The higher number of cropping patterns is generally related to higher level of diversity indices for cropping pattern. The upazilas having lower number of cropping patterns were related to either low land area or water logging or both. The highest value of diversity index for cropping pattern was found 0.950 in Bera upazila that was followed by 0.912 in Chatmohar upazila. The lowest CDI was reported 0.718 in Raiganj of Sirajganj district followed by 0.734 in Kalai upazila in Joypurhat. The highest value of CDI was observed 0.978 in Pabna sadar followed by 0.972 in Bera upazila. The range of cropping intensity values was recorded 183-291%. The maximum value was for Khetlal upazila of Joypurhat district and minimum for Bera upazila of Pabna district. As a whole the CDI of Bogra region was calculated 0.966 and the average cropping intensity at regional level was 234%. In a simultaneous study, the investigators identified 316 cropping patterns for whole Bangladesh; where the CDI value was 0.952 at national level and the national average of cropping intensity was 200% (Nasim et al, 2017). Diversification of crops helps risk reduction as diversification allows a producer to balance low price in one or two crops with reasonable prices in other. (Blade and Slinkard, 2002). The farmers of Kerala diversified their cropping pattern to minimize risk of crop failures and price fluctuations (Mahesh, 1999).

	Upazila	No. of identified pattern	No. of crop	Diversity index for cropping pattern	Crop diversity index (CDI)	C.I. (%)
01	Adamdighi	14	13	0.762	0.909	261
02	Bogra	16	18	0.675	0.879	282
03	Dhunat	22	17	0.535	0.794	215
04	Dubchachia	9	13	0.827	0.866	277
05	Gabtali	20	16	0.614	0.831	218
06	Kahalu	9	11	0.677	0.878	274
07	Nandigram	6	7	0.692	0.893	276
08	Sariakandi	19	17	0.852	0.929	205
09	Sherpur	32	15	0.660	0.863	227
10	Shibganj	16	15	0.499	0.810	282
11	Shajahanpur	22	14	0.761	0.905	241
12	Sonatola	34	22	0.835	0.936	246
13	Akkelpur	19	15	0.647	0.859	260
14	Joypurhat	14	15	0.795	0.920	259
15	Kalai	12	13	0.270	0.734	289
16	Khetlal	17	12	0.402	0.783	291
17	Panchbibi	13	10	0.768	0.908	251
18	Atghroria	28	13	0.868	0.949	237
19	Bera	29	20	0.950	0.972	183
20	Bhangura	16	13	0.859	0.931	196
21	Chatmohar	20	16	0.912	0.961	218
22	Faridpur	11	14	0.816	0.906	200
23	Iswardi	18	17	0.904	0.954	247
24	Pabna sadar	34	21	0.942	0.978	256
25	Santhia	25	16	0.891	0.962	274
26	Sujanagar	28	19	0.843	0.922	201
27	Belkuchi	14	14	0.759	0.894	219
28	Chowhali	26	26	0.901	0.944	196
29	Kazipur	36	21	0.845	0.940	190
30	Kamarkhanda	19	18	0.832	0.919	227
31	Raiganj	21	17	0.425	0.718	203
32	Shahjadpur	19	16	0.703	0.870	217
33	Sirajganj	25	21	0.831	0.917	206
34	Tarash	28	22	0.799	0.899	198
35	Ullapara	26	18	0.777	0.900	209
	Bogra region	177	35	0.919	0.966	234

Table 15. Crop diversity and cropping intensity in Bogra region, 2014-15.

CONCLUSION

The cropping intensity of the Bogra region was higher than the national average. Boro–Fallow–T. Aman, Potato-Boro-T. Aman, Mustard-Boro-Fallow, Mustard-Boro-T. Aman and single Boro were the dominant cropping patterns in the region. Exclusive rice area is about three folds of exclusive non-rice area. In Bogra region crop diversity is much wider than that of other regions. Based on the findings of the study, the following recommendations were made.

- Initiative to be taken to increase productivity of exclusive rice based cropping pattern.
- Effort might be given so that a portion of double-rice area could be brought under Potato-Boro-T. Aman and/or Mustard-Boro-T. Aman cropping systems.
- In the single Boro area suitable vegetables might be grown on floating bed system in wet season.
- The upazilas having unique or exceptional cropping patterns with large area coverage

might be studied in-depth to extrapolate to similar environments.

• Scope might be explored for the establishment of agro-food industry on the basis of potato crop.

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Appendix 1. List of cropping patterns in Bogra region, 2014-15.

001 Broż-Fallow -T. Aman 146250 067 Chill-Aŭs-Fallow -Bickgram 1210 021 Potato-Broor T. Aman 80610 068 Fallow -Fallow -F		Cropping pattern	Area (ha)		Cropping pattern	Area (ha)
002 Potato-Boro-T. Aman 88610 068 Fallow-Fallow 1200 003 Mustard-Boro-T. Aman 40110 071 Vegetab-Vegetab-T. Aman 1100 006 Boro-Aus-T. Aman 40110 071 Vegetab-Vegetab-T. Aman 1100 006 Boro-Aus-T. Aman 19700 022 Crasspoa-Fallow-Fallow 1005 007 Lenth-Stand 1080 072 Crasspoa-Fallow-Fallow 1005 008 Potato-Boro-T. Aman 19700 072 Crasspoa-Fallow-Fallow 1005 009 Winest-Jute-T. Aman 9300 077 Lentil-Jote-T. Aman 980 010 Onion-Jute-T. Aman 7220 078 Crasspoa-Sesame-T. Aman 970 013 Boro-Jute-T. Aman 7200 078 Crasspoa-Jute-T. Aman 800 014 Lentil-Jote-Fallow 6630 088 Crasspoa-Jute-T. Aman 800 016 Mastar-Boro-Jute-Fallow 810 Grasspoa-Jute-T. Aman 800 017 Vegetab-Doro-T. Aman 4700	001	Boro-Fallow-T. Aman	146250	067	Chilli–Aus–Fallow	1210
009	002	Potato-Boro-T. Aman	88610	068	Fallow-Fallow-Blackgram	1210
004 Mustard-Boro-T, Aman 1010 070 Vegetab-Vegetab-T, Aman 1010 005 Boro-Aus-T, Aman 19700 072 Gratspea-Fallow-Fallow 1000 006 Boro-Aus-T, Aman 19700 072 Gratspea-Fallow-Fallow 1000 007 Vegetab-Vegetab-Vegetab 16630 074 Weat-Sesame-Fallow 1000 008 Vegetab-Vegetab-Vegetab-Vegetab 16830 077 Vegetab-Chaine-Fallow-Hackgram 1000 010 Oncin-Jute-T, Aman 1080 074 Vegetab-Fallow-Fallow-Fallow 880 011 Oncin-Jute-T, Aman 7020 079 Vegetab-Fallow-Fallow 900 015 Grasspea-B, Aman 6650 088 Boro-Sesbaria T, Aman 800 017 Vegetab-Boro-T, Aman 4700 088 Cranspea-Jute-T, Aman 800 018 Moat-Ass-Fallow 4200 088 Mustard-BAcyBram 800 019 Chilli-Jate-Fallow-Fallow 420 088 Lentil-Assram 800 024 D	003	Mustard-Boro-Fallow	50940	069	Potato-Maize-T. Aman	1200
065 Boro-Fallow-Fallow 3730 071 Garlic-Aus-T. Aman 1015 076 Boro-B. Aman 18650 077 Vegetab-Onion-Aus 10005 077 Boro-B. Aman 18650 077 Vegetab-Onion-Aus 1000 078 Weat-Jute-T. Aman 14540 072 Vegetab-Onion-Aus 1000 078 Weat-Jute-T. Aman 1980 076 Vegetab-Onion-Aus 1000 079 Vegetab-Onion-Aus 080 077 Cestab-Dation-Aus 1000 0700 1000 Cestab-Dation-Aus 1000	004	Mustard–Boro–T. Aman	40110	070	Vegetab–Vegetab–T. Aman	1030
066 Boro-Aus-T. Aman 19700 072 Grasspea-Fallow-Teglow Tollow 1000 078 Boro-B. Aman 18650 073 Vegetab-Omion-Aus 1000 089 Weat-Leyber-Vegetab-Vegetab 16160 074 Vegetab-Consin-Aus 1000 010 Onion-Jute-Tallow 0088 076 Vegetab-Jute-T. Aman 980 011 Onion-Jute-Tallow 0089 Oreaspear-Same-Ti. Aman 980 012 Wheat-B. Aman 720 076 Grasspear-Same-Ti. Aman 975 013 Carasspear-B. Aman 6470 081 Boro-Sespain-T. Aman 800 014 Long-Jute-Fallow 4700 082 Lenti-Same-Fallow 800 016 Mustard-Boro-B. Aman 6400 083 Grasspea-Jute-T. Aman 800 018 Wheat-Aus-Fallow 4700 084 Groundmut-T-Balow-Fallow 800 019 Cruindmut-Fallow-Fallow 420 085 Lota-Fallow-Fallow 750 020 Groundmut-Fallow-Fallow 330	005	Boro-Fallow-Fallow	37300	071	Garlic-Aus-T. Aman	1010
007 Boro-B. Aman 18650 073 Vegetab-Chion-Aus 1000 008 Vegetab-Vegetab 16030 074 Whats-Sesame-Fallow 1000 009 Winot-Jute-T. Aman 14540 075 Lentil-Sesame+B. Aman 980 011 Onion-Jute-T. Aman 9330 077 Lentil-Jute-T. Aman 970 013 Doro-Jute-T. Aman 920 078 Grasspea-Sesame-T. Aman 970 013 Doro-Jute-T. Aman 720 078 Grasspea-F. Aman 800 014 Lentil-Jute-Tallow 6650 088 Boro-Sesami-T. Aman 800 014 Lentil-Jute-Tallow 4700 084 Lentil-Sesame-Hallow 800 016 Grasspear-B. Aman 4700 084 Lentil-B. Aman 800 017 Wheat-Ause-Fallow 4200 086 Lentil-B. Aman 800 018 Grasspear-Jute-Fallow 420 086 Lentil-B. Aman 700 028 Doro-Leut-Fallow 3730 097 <t< td=""><td>006</td><td>Boro–Aus–T. Aman</td><td>19700</td><td>072</td><td>Grasspea-Fallow-Fallow</td><td>1005</td></t<>	006	Boro–Aus–T. Aman	19700	072	Grasspea-Fallow-Fallow	1005
008 Vegetab-Vegetab-Vegetab 16430 074 Wheat-Sesame-Fallow 1000 009 Wheat-Jute-T. Aman 14540 077 Vegetab-Jute-T. Aman 980 010 Onion-Jute-Tallow 1008 077 Vegetab-Jute-T. Aman 980 010 Onion-Jute-Tallow 1008 077 Vegetab-Jute-T. Aman 970 012 Wheat-B. Aman 7220 078 Grasspea-Sesame-T. Aman 970 018 Dero-Jute-T. Aman 970 018 Dero-Jute-T. Aman 970 018 Dero-Jute-T. Aman 970 019 Vegetab-Jallow-Fallow 1009 000 016 Grasspea-Sesame-T. Aman 970 010 Vegetab-Jallow-Fallow 1009 000 016 Grasspea-B. Aman 6470 081 Dero-Sesama-T. Agran 800 010 Grasspea-B. Amar 6470 083 Grasspea-Jute-T. Aman 800 019 Chilli-Jute-Fallow 44700 083 Grasspea-Jute-T. Aman 800 019 Crausda-Jeore-H. Aus-Fallow 44700 088 Crausda-H. Sesame-Fallow 800 019 Crausda-Jeore-Fallow 4420 088 Lotti-E. Aman 800 019 Crausda-Laws-Fallow 4420 088 Lotti-E. Aman 790 021 Wheat-Jute-Fallow 4420 088 Dotato-Boro-Fallow 780 023 Vegetab/Foldv. Mom 4420 088 Potato-Boro-Fallow 780 023 Vegetab-Vegetab-Fallow 3730 089 Onion-Aus-Blackgram 740 020 Onion-Aus-Blackgram 740 021 Onion-Ass-Blackgram 740 021 Continut-Fallow-Fallow 3300 093 Wheat-Maize-Late-Fallow 750 003 Scrotzbergetab/Foldv. Norm 3340 099 Grafic-Jute-Fallow 750 000 Chilli-Fallow-Fallow 670 003 Grasspea-Jute-Maize	007	Boro–B. Aman	18650	073	Vegetab-Onion-Aus	1000
000 Wheat-Jute-T.Aman 14940 075 Lentil-Sesame+B.Aman 980 076 Vegetab-Jute-T.Aman 980 077 Vegetab-Jute-T.Aman 975 075 0740 076 Vegetab-Jute-T.Aman 975 075 0740 076 Vegetab-Jute-T.Aman 975 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 077 076 0740 0740	008	Vegetab-Vegetab-Vegetab	16030	074	Wheat-Sesame-Fallow	1000
	009	Wheat-Jute-T. Aman	14540	075	Lentil-Sesame+B. Aman	980
	010	Onion-Jute-Fallow	10080	076	Vegetab–Jute–T. Aman	980
	011	Onion-Jute-1. Aman	9330	077	Lentil-Jute-1. Aman	975
	012	Wheat-B. Aman	7920	078	Grasspea-Sesame-1. Aman	970
	013	Boro-Jute-1. Aman	7020	079	Vegetab-Fallow Plaskgroup	900
010 Classical - Brone - Barnan 0100 010 010 010	014	Crassnan-B Amon	6630	080	Boro-Soshania-T Aman	900
	015	Grasspea-D. Allian Mustard-Boro-B. Aman	5000	082	Lontil-Socamo-Fallow	000 810
Order Orgene Orgene <thorgene< th=""> <thorgene< th=""> <thorg< td=""><td>017</td><td>Vegetab-Boro-T Aman</td><td>4760</td><td>082</td><td>Crasspea-Jute-T Aman</td><td>800</td></thorg<></thorgene<></thorgene<>	017	Vegetab-Boro-T Aman	4760	082	Crasspea-Jute-T Aman	800
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	018	Wheat-Aus-Fallow	4700	084	Groundnut-F-Blackgram	800
	019	Chilli–Jute–Fallow	4620	085	Mustard–B Aus+B Aman	800
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122 Boro-Vegetab(Float/Norm) 4000 088 Potato-Boro-Fallow 750 123 Vegetab-Vegetab-Fallow 3730 089 Onion-Aus-Blackgram 740 124 Onion-B. Aman 3650 090 Chilli-Fallow-Fallow 700 125 Wheat-Aus-T. Aman 3640 091 Garlic-jute-T. Aman 700 126 Lenti-Laws-T. Aman 3100 094 Spotato-Fallow-Fallow 670 126 Garlic-B. Aman 100 095 Boro-Aus-Fallow 670 031 Grasspea-Boro-Fallow 2950 097 Maize-Fallow-T. Aman 640 032 Mustard-Jute-T. Aman 2600 099 Potato-Sesame-T. Aman 600 033 Grasspea-Boro-B. Aman 2600 099 Potato-Sesame-T. Aman 600 034 Mustard-Boro-Aus 250 101 Groundurt-Jute-T. Aman 500 035 Maize-Fallow-Fallow 250 101 Groundurt-Jute-T. Aman 500 036 Mustard-Boro-Aus-T. Aman 230 105 Garlic-jute-Fallow 430 037 <td< td=""><td>021</td><td>Wheat-Inte-Fallow</td><td>4090</td><td>087</td><td>S Potato-Inte-Fallow</td><td>780</td></td<>	021	Wheat-Inte-Fallow	4090	087	S Potato-Inte-Fallow	780
123 Vegetab=Vegetab=Fallow 3730 089 Onion=Aus=Backgram 740 124 Onion=A Aman 3650 090 Chilli=Fallow=Fallow 710 125 Wheat=Aus=T. Aman 3630 091 Garlis=Jute=T. Aman 700 126 Lentil=Aus=T. Aman 3100 092 Mustard=Boro-Jute= 700 126 Carlis=Jute=Fallow 3100 094 S.Potato=Fallow-Haize=T. Aman 700 127 Onion=Aus=T. Aman 2950 096 Maize=B. Aman 650 126 Onion=Aus=T. Aman 2950 097 Maize=B. Aman 630 126 Grasspea=Boro-Fallow 2950 097 Maize=B. Aman 640 128 Mustard-Bure-T. Aman 2700 098 Coriander-Vegetab-Fallow 630 126 Grasspea-Boro-B. Aman 2600 100 Grasspea-Jute=Fallow=1. Aman 600 128 Mustard-Bure-T. Aman 2400 102 Sesame=Fallow=Haise 500 126 Wheat=Mare-T. Aman 230 104 Chili-Hus=T. Aman 500 127 Boro-Sesb	022	Boro-Vegetab(Float/Norm)	4000	088	Potato-Boro-Fallow	750
122 Orion-B. Aman 3650 090 Chilli-Fallow-Tallow 710 125 Wheat-Aus-T. Aman 360 091 Garlic-Jute-T. Aman 700 126 Lentil-Aus-T. Aman 3340 092 Mustard-Boro-Jute 700 127 Maize-Jute-Fallow 300 094 Wheat-Maize-T. Aman 700 128 Garlic-B. Aman 2950 096 Maize-Fallow-Fallow 670 031 Grasspea-Boro-Fallow 2950 097 Maize-Fallow-T. Aman 640 032 Mustard-Jute-T. Aman 200 098 Coriander-Vegetab-Fallow 630 033 Grasspea-Boro-B. Aman 200 098 Coriander-Vegetab-Fallow 630 034 Mustard-Boro-Aus 250 101 Groundnut-Jute-T. Aman 500 035 Maize-Fallow-Tallow 250 103 Wheat-Jute-Backgram 500 036 Wheat-Sesame-T. Aman 230 104 Chili-Aus-T. Aman 430 036 Orbin-Jute-Jute-T. Aman 230 105 Gartic-Jute-Fallow-T. Aman 420 040 Mus	023	Vegetab-Vegetab-Fallow	3730	089	Onion-Aus-Blackgram	740
125 Wheat-Aus-T. Aman 3630 091 Garlic-Jute-T. Aman 700 126 Lertil-Aus-T. Aman 3340 092 Mustard-Boro-Jute 700 128 Garlic-B. Aman 3100 094 S.Potato-Fallow-Fallow 675 129 Onion-Vegtab-Vegetab 3100 094 S.Potato-Fallow-Fallow 670 131 Grasspea-Boro-Fallow 2950 096 Maize-B. Aman 660 132 Grasspea-Boro-Fallow 2560 700 Crasspea-Jute-T. Aman 660 133 Grasspea-Boro-Fallow 2560 100 Grasspea-Jute-T. Aman 600 133 Maize-Fallow-Fallow 250 101 Groundnut-Jute-T. Aman 500 134 Maize-Fallow-Fallow 250 101 Groundnut-Jute-T. Aman 500 135 Maize-Fallow-Fallow 2450 103 Wheat-Lackgram 500 136 Mustard-Boro-Aus-T. Aman 230 105 Garlic-Jute-Fallow-Blackgram 400 137 Backgram-T. Aman 230 106 Garlic-Fallow-T. Aman 430 138	024	Onion–B. Aman	3650	090	Chilli–Fallow–Fallow	710
	025	Wheat-Aus-T. Aman	3630	091	Garlic-Jute-T. Aman	700
127 Maize-Jute-Fallow 3300 093 Wheat-Maize-T. Aman 700 128 Garlic-B. Aman 3100 094 SPotato-Fallow-Fallow 675 130 108 100 095 Boro-Aus-Fallow 670 130 Grasspea-Boro-Fallow 2950 096 Maize-Fallow-T. Aman 640 132 Mustard-Jute-T. Aman 2700 098 Coriander-Vegetab-Fallow 630 133 Grasspea-Boro-B. Aman 2600 099 Potato-Sesame-T. Aman 600 034 Mustard-Boro-Aus 2560 100 Grasspea-Jute-Fallow 550 035 Maize-Fallow-Fallow 250 101 Groundnut-Jute-T. Aman 500 035 Mustard-Boro-Aus-T. Aman 230 103 Wheat-Jute-Blackgram 500 036 Mustard-Boro-Aus-T. Aman 2300 105 Garlic-Jute-T. Aman 430 039 Chilli-Jute-T. Aman 2300 106 Garlic-Tallow-T. Aman 420 041 Mustard-Boro-Aus-T. Aman 220 108 Mustard-Mus-T. Aman 400 042 Po	026	Lentil-Aus-T. Aman	3340	092	Mustard-Boro-Jute	700
	027	Maize-Jute-Fallow	3300	093	Wheat-Maize-Ť. Aman	700
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030 Blackgram 2950 096 Maize-Fallow-T. Aman 650 031 Grasspea-Boro-Fallow 2950 097 Maize-Fallow-T. Aman 640 032 Mustard-Jute-T. Aman 2000 099 Potato-Seasame-T. Aman 600 033 Grasspea-Boro-A. 2560 100 Grasspea-Jute-Fallow 550 035 Maize-Fallow-Fallow 2520 101 Groundnut-Jute-T. Aman 500 036 Wheat-Sesame-T. Aman 2470 102 Sesame-Fallow-Blackgram 500 037 Boro-Sesbania-Fallow 2450 103 Wheat-Jute-Blackgram 500 038 Mustard-Boro-Aus-T. Aman 2300 106 Garlic-Jute-Fallow 430 040 Mustard-Boro-Aus-T. Aman 2200 109 Mustard-Muse-Maren 400 041 Maize-Jute-T. Aman 2200 109 Mustard-Muse-Maren 400 043 Mustard-Boro-Aus-T. Aman 2200 109 Mustard-Murgbean-T. Aman 400 045 Wheat-Vegetab-Vegetab 2100 111 Pea-B. Aman 400 045 <td>029</td> <td>Onion-Vegtab-Vegetab</td> <td>3100</td> <td>095</td> <td>Boro-Aus-Fallow</td> <td>670</td>	029	Onion-Vegtab-Vegetab	3100	095	Boro-Aus-Fallow	670
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032 Mustard-Jute-T. Aman 2700 098 Coriander-Vegetab-Fallow 630 033 Grasspea-Boro-B. Aman 2600 009 Potato-Sesame-T. Aman 600 034 Mustard-Boro-Aus 2560 100 Grauspea-Jute-Fallow 550 035 Maize-Fallow-Fallow 2520 101 Groundnut-Jute-T. Aman 500 036 Wheat-Sesame-T. Aman 2470 102 Sesame-Fallow-Blackgram 500 037 Boro-Sesbania-Fallow 2430 103 Wheat-Jute-Fallow-Haman 430 039 Chilli-Jute-T. Aman 2300 106 Garlic-Jute-Fallow-T. Aman 430 040 Mustard-B. Aman 2300 106 Garlic-Fallow-T. Aman 420 041 Maize-Jute-T. Aman 2200 109 Mustard-Aus-Blackgram 400 043 Mustard-Aus-T. Aman 2200 100 Mustard-Aus-Blackgram 400 044 Onion-Sesame-T. Aman 200 110 Mustard-Aus-T. Aman 400 045 Wegetab-Aus-Fallow 2060 112 Groundnut-Millet(kaon)-F 380	031	Grasspea-Boro-Fallow	2950	097	Maize-Fallow-T. Aman	640
033 Grasspea-Boro-B, Aman 260 099 Potato-Sesame-T, Aman 600 034 Mustard-Boro-Aus 2560 100 Grasspea-Jute-Fallow 550 035 Maize-Fallow-Fallow 2520 101 Groundnut-Jute-T. Aman 500 036 Wheat-Sesame-T, Aman 2470 102 Sesame-Fallow-Blackgram 500 038 Mustard-Boro-Aus-T. Aman 2300 105 Garlic-Jute-Fallow 430 039 Chilli-Jute-T. Aman 2300 105 Garlic-Fallow-T. Aman 420 041 Maize-Jute-T. Aman 2255 107 Boro-Aus-Blackgram 410 042 Potato-Boro-Aus-T. Aman 2200 109 Mustard-Aus-Blackgram 400 043 Mustard-Aus-T. Aman 2200 110 Mustard-Mungbean-T. Aman 400 044 Onion-Sesame-T. Aman 200 111 Pea-B. Aman 400 045 Wheat-Wegetab-Vegetab 2100 111 Pea-B. Aman 400 045 Wheat-Mungbean-T. Aman 1900 113 Vegetab-Jute-Vegetab 380 047	032	Mustard–Jute–T. Aman	2700	098	Coriander–Vegetab–Fallow	630
034 Mustard-Boro-Aus 2560 100 Grasspea-Jute-Fallow 550 035 Maize-Fallow-Fallow 2520 101 Groundnut-Jute-T. Aman 500 036 Wheat-Sesame-T. Aman 2470 102 Sesame-Fallow-Blackgram 500 037 Boro-Sesbania-Fallow 2450 103 Wheat-Jute-Blackgram 500 038 Mustard-Boro-Aus-T. Aman 2300 105 Garlic-Jute-Fallow 430 040 Mustard-B. Aman 2300 106 Garlic-Fallow-T. Aman 420 041 Maize-Jute-T. Aman 2255 107 Boro-Aus-Blackgram 410 042 Potato-Boro-Aus-T. Aman 2200 110 Mustard-Aus-Fallow 400 044 Onion-Sesame-T. Aman 2200 110 Mustard-Mungbean-T. Aman 400 044 Onion-Sesame-T. Aman 200 111 Pea-B Aman 400 044 Onion-Sesame-T. Aman 200 113 Vegetab-Jute-Vegetab 380 047 B.gram(Fod)-Boro-B. Aman 200 113 Vegetab-Lus-Fallow 350 047	033	Grasspea–Boro–B. Aman	2600	099	Potato-Sesame-T. Aman	600
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	034	Mustard-Boro-Aus	2560	100	Grasspea-Jute-Fallow	550
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	035	Maize-Fallow-Fallow	2520	101	Groundnut–Jute–T. Aman	500
057 Boro-Sesbania-Fallow 2450 103 Wheat-Jute-Blackgram 500 038 Mustard-Boro-Aus-T. Aman 2300 104 Chilli-Jute-T. Aman 430 040 Mustard-B. Aman 2300 105 Garlic-Fallow-T. Aman 420 041 Mustard-B. Aman 2255 107 Boro-Aus-T. Aman 420 042 Potato-Boro-Aus-T. Aman 2250 108 Grasspea-Sesbania-Fallow 400 043 Mustard-Aus-T. Aman 2200 110 Mustard-Mus-Blackgram 400 044 Onion-Sesame-T. Aman 2200 110 Mustard-Mus-Blackgram 400 045 Wheat-Vegetab-Vegetab 2100 111 Pea-B. Aman 400 046 Vegetab-Aus-Fallow 2060 112 Groundnut-Millet(<i>kaon</i>)-F 380 048 Wheat-Mungbean-T. Aman 1900 114 Onion-Sesame-Fallow 350 060 noion-Aus-T. Aman 1910 116 Maize-Aus-Fallow 320 050 Onion-Aus-T. Aman <t< td=""><td>036</td><td>Wheat-Sesame-T. Aman</td><td>2470</td><td>102</td><td>Sesame–Fallow–Blackgram</td><td>500</td></t<>	036	Wheat-Sesame-T. Aman	2470	102	Sesame–Fallow–Blackgram	500
038 Mustard-Boro-Aus-I, Aman 230 104 Chilli-Jute-T, Aman 430 039 Chilli-Jute-T, Aman 2300 105 Garlic-Fallow-T, Aman 420 041 Maize-Jute-T, Aman 2255 107 Boro-Aus-Blackgram 410 042 Potato-Boro-Aus-T, Aman 2250 108 Grasspea-Sesbania-Fallow 400 043 Mustard-Aus-T, Aman 2200 109 Mustard-Aus-Blackgram 400 044 Onion-Sesame-T, Aman 2200 109 Mustard-Aus-Blackgram 400 045 Wheat-Vegetab-Vegetab 2100 111 Pea-B. Aman 400 046 Vegetab-Aus-Fallow 2060 112 Groundnut-Millet(kaon)-F 380 047 B.gram(Fod)-Boro-B. Aman 2000 113 Vegetab-Jute-Vegetab 380 048 Wheat-Mungbean-T. Aman 1990 114 Onion-Sesame-Fallow 320 051 Boro-Jute-Fallow 1900 117 Maize-Maize-T. Aman 320 052 Onion-Aus-T. Aman 1800 118 Mustard-Sesame-F. Aman 320 <td< td=""><td>037</td><td>Boro-Sesbania-Fallow</td><td>2450</td><td>103</td><td>Wheat-Jute-Blackgram</td><td>500</td></td<>	037	Boro-Sesbania-Fallow	2450	103	Wheat-Jute-Blackgram	500
039Chilli-jute-1. Aman2300105Garlic-Jute-Fallow430040Mustard-B. Aman2300106Garlic-Fallow-T. Aman420041Maize-Jute-T. Aman2255107Boro-Aus-Blackgram410042Potato-Boro-Aus-T. Aman2250108Grasspea-Sesbania-Fallow400043Mustard-Aus-T. Aman2200109Mustard-Aus-Blackgram400044Onion-Sesame-T. Aman2200110Mustard-Mungbean-T. Aman400045Wheat-Vegetab-Vegetab2100111Pea-B. Aman400046Vegetab-Aus-Fallow2060112Groundnut-Millet(<i>kaon</i>)-F380047B.gram(Fod)-Boro-B. Aman2000113Vegetab-Jute-Vegetab380048Wheat-Mungbean-T. Aman1990114Onion-Sesame-Fallow350049Boro-Fallow-Blackgram1960115Garlic-Vegetab-Vegetab345050Onion-Aus-T. Aman1910116Maize-Maize-T. Aman330051Boro-Jute-Fallow1900117Maize-Mais-Fallow320052Orion-Sesame+B. Aman1700121Maize-Sesame-T. Aman300054Millet(<i>kaon</i>)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1660122Potato-Boro-Vegetab300056Crasspea-Sesame+B. Aman1665124Potato-Maize-Aus-Vegetab300057Potato-Vegetab-T. Aman1650 <td< td=""><td>038</td><td>Mustard-Boro-Aus-T. Aman</td><td>2330</td><td>104</td><td>Chilli–Aus–T. Aman</td><td>430</td></td<>	038	Mustard-Boro-Aus-T. Aman	2330	104	Chilli–Aus–T. Aman	430
040Mustard-D. Aman2500106Garlie-Failow-T. Aman420041Maize-Jute-T. Aman255107Boro-Aus-Blackgram410042Potato-Boro-Aus-T. Aman2200108Grasspea-Sesbania-Fallow400043Mustard-Aus-T. Aman2200109Mustard-Aus-Blackgram400044Onion-Sesame-T. Aman2200110Mustard-Mungbean-T. Aman400045Wheat-Vegetab-Vegetab2100111Pea-B. Aman400046Vegetab-Aus-Fallow2060112Groundnut-Millet(kaon)-F380047B.gram(Fod)-Boro-B. Aman2000113Vegetab-Jute-Vegetab380048Wheat-Mungbean-T. Aman1990114Onion-Sesame-Fallow350049Boro-Fallow-Blackgram1960115Garlic-Vegetab-Vegetab345050Onion-Aus-T. Aman1910116Maize-Aus-Fallow320052Onion-Sesame+B. Aman1800118Mustard-Sesame-T. Aman320053Vegetab-Fallow-T. Aman1790119Groundnut-Sesame-Fallow300054Millet(kaon)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1670123Potato-Maize-Aus-Vegetab300056Lentil-Sesame-T. Aman1665124Potato-Maize-Aus-Vegetab300057Potato-Vegetab-T. Aman1665124Potato-Maize-Aus-Vegetab300058Vegetab-Aus-T. Aman<	039	Chilli-Jute-1. Aman	2300	105	Garlic-Jute-Fallow	430
041 Marze-Jute-T. Aman 2253 100 Boro-Faks-Fallow 410 042 Potato-Boro-Aus-T. Aman 2200 108 Grasspea-Sesbania-Fallow 400 043 Mustard-Aus-T. Aman 2200 109 Mustard-Aus-Blackgram 400 044 Onion-Sesame-T. Aman 2200 110 Mustard-Mungbean-T. Aman 400 045 Wheat-Vegetab-Vegetab 2100 111 Pea-B. Aman 400 046 Vegetab-Aus-Fallow 2060 112 Groundnut-Millet(kaon)-F 380 047 B.gram(Fod)-Boro-B. Aman 2000 113 Vegetab-Jute-Vegetab 380 048 Wheat-Mungbean-T. Aman 1990 114 Onion-Sesame-Fallow 350 049 Boro-Fallow-Blackgram 1960 115 Garlic-Vegetab-Vegetab 345 050 Onion-Aus-T. Aman 1910 116 Maize-Maize-T. Aman 330 051 Boro-Jute-Fallow 1900 117 Maize-Aus-Fallow 300 054 Millet(kaon)+Sesame-F 1720 120 Lentil-Aus-Fallow 300 055 <td>040</td> <td>Maiza Luta T Aman</td> <td>2300</td> <td>106</td> <td>Garric-Fallow-1. Aman</td> <td>420</td>	040	Maiza Luta T Aman	2300	106	Garric-Fallow-1. Aman	420
043 Mustard-Aus-T. Aman 2200 109 Mustard-Aus-Blackgram 400 044 Onion-Sesame-T. Aman 2200 110 Mustard-Mungbean-T. Aman 400 044 Onion-Sesame-T. Aman 2200 110 Mustard-Mungbean-T. Aman 400 045 Wheat-Vegetab-Vegetab 2100 111 Pea-B. Aman 400 046 Vegetab-Aus-Fallow 2060 112 Groundnut-Millet(kaon)-F 380 047 B.gram(Fod)-Boro-B. Aman 2000 113 Vegetab-Jute-Vegetab 380 048 Wheat-Mungbean-T. Aman 1990 114 Onion-Sesame-Fallow 350 049 Boro-Fallow-Blackgram 1960 115 Garlic-Vegetab-Vegetab 345 051 Boro-Jute-Fallow 1900 117 Maize-Aus-Fallow 320 052 Onion-Sesame+B. Aman 1800 118 Mustard-Aus-Fallow 300 054 Millet(kaon)+Sesame-F 1720 120 Lentil-Aus-Fallow 300 055 Grasspea-Sesame+B. Aman 1680 122 Potato-Maize-Aus 300 05	041	Naize-Jute-1. Aman	2255	107	Crassnon-Sashania-Fallow	410
044 Onion-Sesame-T. Aman 2200 110 Mustard-Aus-Dakkgram 400 044 Onion-Sesame-T. Aman 2200 110 Mustard-Mungbean-T. Aman 400 045 Wheat-Vegetab-Vegetab 2100 111 Pea-B. Aman 400 045 Wheat-Mungbean-T. Aman 2000 113 Vegetab-Jute-Vegetab 380 047 B.gram(Fod)-Boro-B. Aman 2000 113 Vegetab-Jute-Vegetab 380 048 Wheat-Mungbean-T. Aman 1990 114 Onion-Sesame-Fallow 350 049 Boro-Fallow-Blackgram 1960 115 Garlic-Vegetab-Vegetab 345 050 Onion-Aus-T. Aman 1910 116 Maize-Maize-T. Aman 320 051 Boro-Jute-Fallow 1900 117 Maize-Sesame-T. Aman 320 052 Onion-Sesame+B. Aman 1800 118 Mustard-Aus-Fallow 300 053 Vegetab-Fallow-T. Aman 1660 124 Potato-Baro-Vegetab 300 055 Grasspea-Sesame+B. Aman </td <td>042</td> <td>Mustard-Aus-T Aman</td> <td>2200</td> <td>100</td> <td>Mustard - Aug-Blackgrom</td> <td>400</td>	042	Mustard-Aus-T Aman	2200	100	Mustard - Aug-Blackgrom	400
045Wheat-Vegetab-Vegetab2100111Pea-B. Aman400045Wheat-Vegetab-Vegetab2100111Pea-B. Aman400046Vegetab-Aus-Fallow2060112Groundnut-Millet($kaon$)-F380047B.gram(Fod)-Boro-B. Aman2000113Vegetab-Jute-Vegetab380048Wheat-Mungbean-T. Aman1990114Onion-Sesame-Fallow350049Boro-Fallow-Blackgram1960115Garlic-Vegetab-Vegetab345050Onion-Aus-T. Aman1910116Maize-Maize-T. Aman330051Boro-Jute-Fallow1900117Maize-Maize-T. Aman320052Onion-Aus-T. Aman1800118Mustard-Sesame-T. Aman320053Vegetab-Fallow-T. Aman1790119Groundnut-Sesame-Fallow300054Millet($kaon$)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1660122Potato-Boro-Vegetab300056Lentil-Sesame-T. Aman1667123Potato-Maize-AusSogetab059Chilli-Vegetab-Fallow1650125Vegetab-Boro-Jute300059Chilli-Vegetab-Fallow1650125Vegetab-Boro-Jute300061Fallow-Fallow-T. Aman1550127Lentil-Vegetab-Vegetab280061Fallow-Fallow-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129 <t< td=""><td>043</td><td>Onion-Sesame-T Aman</td><td>2200</td><td>110</td><td>Mustard-Munghean-T Aman</td><td>400</td></t<>	043	Onion-Sesame-T Aman	2200	110	Mustard-Munghean-T Aman	400
016Viegetab2100111Interaction100046Viegetab-Aus-Fallow2060112Groundut-Millet(kaon)-F380047B.gram(Fod)-Boro-B. Aman2000113Vegetab-Jute-Vegetab380048Wheat-Mungbean-T. Aman1990114Onion-Sesame-Fallow350049Boro-Fallow-Blackgram1960115Garlic-Vegetab-Vegetab345050Onion-Aus-T. Aman1910116Maize-Maize-T. Aman330051Boro-Jute-Fallow1900117Maize-Aus-Fallow320052Onion-Sesame+B. Aman1800118Mustard-Sesame-T. Aman320053Vegetab-Fallow-T. Aman1790119Groundnut-Sesame-Fallow300054Millet(kaon)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1700121Maize-Sesame-T. Aman300056Lentil-Sesame-T. Aman1660122Potato-Maize-Aus300057Potato-Vegetab-T. Aman1665124Potato-Maize-Aus300058Vegetab-Fallow1650125Vegetab-Boro-Jute300059Chilli-Vegetab-Fallow1500129Boro-Jute300060Wheat-Fallow-T. Aman1550127Lentil-Vegetab-Vegetab280061Fallow-Fallow-T. Aman1500128Wheat-Fallow-Fallow200063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman <td< td=""><td>044</td><td>Wheat-Vegetab-Vegetab</td><td>2200</td><td>110</td><td>Pea-B Aman</td><td>400</td></td<>	044	Wheat-Vegetab-Vegetab	2200	110	Pea-B Aman	400
047B.gram(Fod)-Boro-B. Aman2000111Vegetab-Jute-Vegetab380048Wheat-Mungbean-T. Aman1990114Onion-Sesame-Fallow350049Boro-Fallow-Blackgram1960115Garlic-Vegetab-Vegetab345050Onion-Aus-T. Aman1910116Maize-Maize-T. Aman330051Boro-Jute-Fallow1900117Maize-Maize-T. Aman320052Onion-Sesame+B. Aman1800118Mustard-Sesame-T. Aman320053Vegetab-Fallow-T. Aman1770119Groundnut-Sesame-Fallow300054Millet(kaon)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1680122Potato-Boro-Vegetab300055Grasspea-Sesame-T. Aman1667123Potato-Maize-Aus300056Lentil-Sesame-T. Aman1665124Potato-Maize-Aus300057Potato-Vegetab-T. Aman1665124Potato-Maize-Aus300058Vegetab-Fallow1650125Vegetab-Boro-Jute300060Wheat-Fallow-T. Aman1550127Lentil-Vegetab270061Fallow-Fallow-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1500128Wheat	046	Vegetab-Aus-Fallow	2060	112	Groundput-Millet(kaon)-F	380
018Wheat-Mungbean-T. Aman1000114Onion-Sesame-Fallow350048Wheat-Mungbean-T. Aman1960115Garlic-Vegetab-Vegetab345050Onion-Aus-T. Aman1910116Maize-Maize-T. Aman330051Boro-Jute-Fallow1900117Maize-Aus-Fallow320052Onion-Sesame+B. Aman1800118Mustard-Sesame-T. Aman320053Vegetab-Fallow-T. Aman1790119Groundnut-Sesame-Fallow300054Millet(kaon)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1700121Maize-Sesame-T. Aman300056Lentil-Sesame-T. Aman1680122Potato-Boro-Vegetab300057Potato-Vegetab-T. Aman1665124Potato-Maize-Aus-Vegetab300058Vegetab-Fallow1650125Vegetab-Boro-Jute300059Chilli-Vegetab-Fallow1550127Lentil-Vegetab280060Wheat-Fallow-T. Aman1560126Pea-Aus-Vegetab280061Fallow-Fallow-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200064Fallow-Sesame+B. Aman1400130Potat	040	B gram(Fod)=Boro=B Aman	2000	112	Vegetab-Inte-Vegetab	380
049 Boro-Fallow-Blackgram 1960 115 Garlic-Vegetab-Vegetab 345 050 Onion-Aus-T. Aman 1910 116 Maize-Maize-T. Aman 330 051 Boro-Jute-Fallow 1900 117 Maize-Maize-T. Aman 320 052 Onion-Sesame+B. Aman 1800 118 Mustard-Sesame-T. Aman 320 053 Vegetab-Fallow-T. Aman 1790 119 Groundnut-Sesame-T. Aman 300 054 Millet(<i>kaon</i>)+Sesame-F 1720 120 Lentil-Aus-Fallow 300 055 Grasspea-Sesame+B. Aman 1700 121 Maize-Sesame-T. Aman 300 055 Grasspea-Sesame+B. Aman 1680 122 Potato-Boro-Vegetab 300 056 Lentil-Sesame-T. Aman 1665 124 Potato-Maize-Aus Vegetab 300 057 Potato-Vegetab-Fallow 1650 125 Vegetab-Boro-Jute 300 058 Vegetab-Fallow-T. Aman 1665 124 Potato-Maize-Aus-Vegetab 300 058 Chillow-Fallow-T. Aman 1550 127 Lentil-Vegetab-Boro-Jute	048	Wheat-Mungbean-T. Aman	1990	114	Onion-Sesame-Fallow	350
050Onion-Aus-T. Aman1910116Maize-Maize-T. Aman330051Boro-Jute-Fallow1900117Maize-Aus-Fallow320052Onion-Sesame+B. Aman1800118Mustard-Sesame-T. Aman320053Vegetab-Fallow-T. Aman1790119Groundnut-Sesame-Fallow300054Millet(kaon)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1700121Maize-Sesame-T. Aman300056Lentil-Sesame-T. Aman1680122Potato-Boro-Vegetab300057Potato-Vegetab-T. Aman1665124Potato-Maize-Aus300058Vegetab-Aus-T. Aman1665124Potato-Maize-Aus-Vegetab300059Chill-Vegetab-Fallow1550125Vegetab-Boro-Jute300060Wheat-Fallow-T. Aman1560126Pea-Aus-Vegetab280061Fallow-T. Aman1550127Lentil-Vegetab-Vegetab270062Millet(kaon)-F-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow-Blackgram200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200066Vegetab-Jute-Fallow1240132 <td>049</td> <td>Boro-Fallow-Blackgram</td> <td>1960</td> <td>115</td> <td>Garlic-Vegetab-Vegetab</td> <td>345</td>	049	Boro-Fallow-Blackgram	1960	115	Garlic-Vegetab-Vegetab	345
051Boro-Jute-Fallow1900117Maize-Aus-Fallow320052Onion-Sesame+B. Aman1800118Mustard-Sesame-T. Aman320053Vegetab-Fallow-T. Aman1790119Groundnut-Sesame-Fallow300054Millet(kaon)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1700121Maize-Sesame-T. Aman300056Lentil-Sesame-T. Aman1680122Potato-Boro-Vegetab300057Potato-Vegetab-T. Aman1665124Potato-Maize-Aus300058Vegetab-Aus-T. Aman1665124Potato-Maize-Aus-Vegetab300059Chill-Vegetab-Fallow1650125Vegetab-Boro-Jute300060Wheat-Fallow-T. Aman1560126Pea-Aus-Vegetab280061Fallow-T. Aman1550127Lentil-Vegetab-Vegetab270062Millet(kaon)-F-T. Aman1500128Wheat-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200	050	Onion-Aus-T. Aman	1910	116	Maize-Maize-T. Aman	330
052Onion-Sesame+B. Aman1800118Mustard-Sesame-T. Aman320053Vegetab-Fallow-T. Aman1790119Groundnut-Sesame-Fallow300054Millet(kaon)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1700121Maize-Sesame-T. Aman300056Lentil-Sesame-T. Aman1680122Potato-Boro-Vegetab300057Potato-Vegetab-T. Aman1665124Potato-Maize-Aus300058Vegetab-Aus-T. Aman1665124Potato-Maize-Aus-Vegetab300059Chilli-Vegetab-Fallow1650125Vegetab-Boro-Jute300060Wheat-Fallow-T. Aman1560126Pea-Aus-Vegetab280061Fallow-T. Aman1550127Lentil-Vegetab-Vegetab270062Millet(kaon)-F-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow-T. Aman200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133.177Other 45 patterns (Table 9)3045	051	Boro-Jute-Fallow	1900	117	Maize-Aus-Fallow	320
053Vegetab–Fallow–T. Aman1790119Groundnut–Sesame–Fallow300054Millet(kaon)+Sesame–F1720120Lentil–Aus–Fallow300055Grasspea–Sesame+B. Aman1700121Maize–Sesame–T. Aman300056Lentil–Sesame–T. Aman1680122Potato–Boro–Vegetab300057Potato–Vegetab–T. Aman1670123Potato–Maize–Aus300058Vegetab–Aus–T. Aman1665124Potato–Maize–Aus–Vegetab300059Chilli–Vegetab–Fallow1650125Vegetab–Boro–Jute300060Wheat–Fallow–T. Aman1560126Pea–Aus–Vegetab280061Fallow–Fallow–T. Aman1550127Lentil–Vegetab–Vegetab270062Millet(kaon)–F–T. Aman1500128Wheat–Fallow–Fallow230063Potato–Maize–Vegetab1500129Boro–Vegetab–T. Aman200064Fallow–Sesame+B. Aman1400130Potato–Fallow–T. Aman200065Potato–Jute–T. Aman1280131Sesame–Aus–Fallow200066Vegetab–Jute–Fallow1240132Vegetab–Fallow–Blackgram200133.177Other 45 patterns(Table 9)3045	052	Onion-Sesame+B. Aman	1800	118	Mustard-Sesame-T. Aman	320
054Millet(kaon)+Sesame-F1720120Lentil-Aus-Fallow300055Grasspea-Sesame+B. Aman1700121Maize-Sesame-T. Aman300056Lentil-Sesame-T. Aman1680122Potato-Boro-Vegetab300057Potato-Vegetab-T. Aman1670123Potato-Maize-Aus300058Vegetab-Aus-T. Aman1665124Potato-Maize-Aus-Vegetab300059Chilli-Vegetab-Fallow1650125Vegetab-Boro-Jute300060Wheat-Fallow-T. Aman1560126Pea-Aus-Vegetab280061Fallow-Fallow-T. Aman1550127Lentil-Vegetab-Vegetab270062Millet(kaon)-F-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow-Blackgram200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133.177Other 45 patterns (Table 9)3045	053	Vegetab–Fallow–T. Aman	1790	119	Groundnut-Sesame-Fallow	300
055Grasspea-Sesame+B. Aman1700121Maize-Sesame-T. Aman300056Lentil-Sesame-T. Aman1680122Potato-Boro-Vegetab300057Potato-Vegetab-T. Aman1670123Potato-Maize-Aus300058Vegetab-Aus-T. Aman1665124Potato-Maize-Aus-Vegetab300059Chilli-Vegetab-Fallow1650125Vegetab-Boro-Jute300060Wheat-Fallow-T. Aman1550127Lentil-Vegetab-Vegetab280061Fallow-Fallow-T. Aman1550127Lentil-Vegetab-Vegetab270062Millet(kaon)-F-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133.177Other 45 patterns (Table 9)3045	054	Millet(kaon)+Sesame-F	1720	120	Lentil-Aus-Fallow	300
056Lentil-Sesame-T. Aman1680122Potato-Boro-Vegetab300057Potato-Vegetab-T. Aman1670123Potato-Maize-Aus300058Vegetab-Aus-T. Aman1665124Potato-Maize-Aus-Vegetab300059Chilli-Vegetab-Fallow1650125Vegetab-Boro-Jute300060Wheat-Fallow-T. Aman1560126Pea-Aus-Vegetab280061Fallow-Fallow-T. Aman1550127Lentil-Vegetab-Vegetab270062Millet(kaon)-F-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133.177Other 45 patterns (Table 9)3045	055	Grasspea-Śesame+B. Aman	1700	121	Maize-Sesame-T. Aman	300
057Potato-Vegetab-T. Aman1670123Potato-Maize-Aus300058Vegetab-Aus-T. Aman1665124Potato-Maize-Aus-Vegetab300059Chilli-Vegetab-Fallow1650125Vegetab-Boro-Jute300060Wheat-Fallow-T. Aman1560126Pea-Aus-Vegetab280061Fallow-Fallow-T. Aman1550127Lentil-Vegetab-Vegetab270062Millet(kaon)-F-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133.177Other 45 patterns (Table 9)3045	056	Lentil–Sesame–T. Aman	1680	122	Potato-Boro-Vegetab	300
058 Vegetab-Aus-T. Aman 1665 124 Potato-Maize-Aus-Vegetab 300 059 Chilli-Vegetab-Fallow 1650 125 Vegetab-Boro-Jute 300 060 Wheat-Fallow-T. Aman 1560 126 Pea-Aus-Vegetab 280 061 Fallow-Fallow-T. Aman 1550 127 Lentil-Vegetab-Vegetab 270 062 Millet(kaon)-F-T. Aman 1550 127 Lentil-Vegetab-Vegetab 230 063 Potato-Maize-Vegetab 1500 128 Wheat-Fallow-Fallow 230 064 Fallow-Sesame+B. Aman 1400 130 Potato-Fallow-T. Aman 200 065 Potato-Jute-T. Aman 1280 131 Sesame-Aus-Fallow 200 066 Vegetab-Jute-Fallow 1240 132 Vegetab-Fallow-Blackgram 200 066 Vegetab-Fallow 1240 132 Vegetab-Fallow-Blackgram 200 133.177 Other 45 patterns (Table 9) 3045 3045	057	Potato-Vegetab-T. Aman	1670	123	Potato-Maize-Aus	300
059 Chilli-Vegetab-Fallow 1650 125 Vegetab-Boro-Jute 300 060 Wheat-Fallow-T. Aman 1560 126 Pea-Aus-Vegetab 280 061 Fallow-Fallow-T. Aman 1550 127 Lentil-Vegetab-Vegetab 270 062 Millet(<i>kaon</i>)-F-T. Aman 1550 127 Lentil-Vegetab-Vegetab 230 063 Potato-Maize-Vegetab 1500 128 Wheat-Fallow-Fallow 230 064 Fallow-Sesame+B. Aman 1400 130 Potato-Fallow-T. Aman 200 065 Potato-Jute-T. Aman 1280 131 Sesame-Aus-Fallow 200 066 Vegetab-Jute-Fallow 1240 132 Vegetab-Fallow-Blackgram 200 066 Vegetab-Jute-Fallow 1240 132 Vegetab-Fallow-Blackgram 200	058	Vegetab-Aus-T. Aman	1665	124	Potato-Maize-Aus-Vegetab	300
060Wheat-Fallow-T. Aman1560126Pea-Aus-Vegetab280061Fallow-Fallow-T. Aman1550127Lentil-Vegetab-Vegetab270062Millet(kaon)-F-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133.177Other 45 patterns (Table 9)3045	059	Chilli–Vegetab–Fallow	1650	125	Vegetab-Boro-Jute	300
061Fallow-Fallow-T. Aman1550127Lentil-Vegetab-Vegetab270062Millet(kaon)-F-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133.177Other 45 patterns (Table 9)3045	060	Wheat–Fallow–T. Aman	1560	126	Pea-Aus-Vegetab	280
062Millet(kaon)-F-T. Aman1500128Wheat-Fallow-Fallow230063Potato-Maize-Vegetab1500129Boro-Vegetab-T. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133,177Other 45 patterns (Table 9)3045	061	Fallow-Fallow-T. Aman	1550	127	Lentil-Vegetab-Vegetab	270
U63Potato-Matze-Vegetab1500129Boro-Vegetab-1. Aman200064Fallow-Sesame+B. Aman1400130Potato-Fallow-T. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133134Sesame-Aus-Fallow200132132133066134132Vegetab-Fallow-Blackgram200133134132Vegetab-Fallow-Blackgram200133134134134134134135134134134135134135134134134134134134134134134135134134134134134134134134134135134134134134136134134134134137134134	062	Millet(<i>kaon</i>)-F-T. Aman	1500	128	Wheat-Fallow-Fallow	230
004railow-besame+b. Aman1400130Potato-Fallow-1. Aman200065Potato-Jute-T. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133132Vegetab-Fallow-Glabe 9)3045	063	Potato-Maize-Vegetab	1500	129	Boro-Vegetab-1. Aman	200
065Fotato-jute-1. Aman1280131Sesame-Aus-Fallow200066Vegetab-Jute-Fallow1240132Vegetab-Fallow-Blackgram200133.177Other 45 patterns (Table 9)3045	064	Fallow-Sesame+B. Aman	1400	130	Potato-Fallow-1. Aman	200
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	000	regelab jule rallow	1240	133-177	Other 45 patterns (Table 9)	3045