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Traditional Rice Varieties (*Oryza Sativa L.*) Cultivated in Bongaigaon Area of Bongaigaon District, Assam

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Abstract: *Future of crop production and crop improvement depends on rich diversity of different crop species. Bongaigaon area of Bongaigaon district is rich in rice diversity. This rich diversity of rice serves as a valuable genetic resource for future rice crop improvement to meet the ever-increasing demand for rice production. These different varieties of rice form the initial material for selecting suitable parents for hybridization for economic and genetic studies. Though due to population growth and increase demands of food the farmers have to adopt new agricultural technology for greater production using High Yielding Varieties (HYV), but still the small and marginal farmers of Bongaigaon area are still in practice of growing some traditional varieties. These genotypes i.e., the traditional varieties have great importance, as future of crop improvement needs the genetic variation. So characterization and popularization of these different varieties is most important for conservation of germplasm and crop improvement. With an aim to see the rice diversity along with their quality and uses a field study was made in Bongaigaon area of Bogaigaon district during the rice harvesting period of 2012 and 2013. Forty three different traditional rice varieties were found during my study period having their own characteristics.*

Keywords: *Crop improvement, HYV, ICAR, rice diversity, traditional variety.*

INTRODUCTION

Rice is the major cereal crop playing significant role in diet, culture and economy of millions of people across the world. It is the leading food source in terms of calories being consumed for mankind and feeds about 60% of the world's population (Das *et al.*, 2010). Developing improved varieties is one of the major thrusts of rice research since its beginning. After the establishment of Indian Council of Agricultural Research (ICAR) in 1929 rice research projects were initiated in various states of the country. More than 800 improved varieties so far have been released in the country by national and state research establishments (Thiyagarajan and Gujja, 2013).

As a result of the ICAR Japonica-Indica Hybridization Project, a number of local as well as exotic high yielding varieties of rice were introduced on a large scale in India. Simultaneously, the breeding programme to develop indigenous high yielding varieties suitable for specific agro-climatic zones of the country was taken up in the All India Coordinated Rice Improvement Project under the aegis of ICAR. Some State Governments have also released high yielding varieties evolved in their States to meet the requirements of the specific agro-climatic and soil zones (Panda, 2010). Rice is the principal crop of north eastern region of India where a considerable range of diversity exists (Hore. D.K. 2005). The Eastern Himalayan region of Northeast (NE) India is home to a large number of indigenous rice varieties (Choudhury B. 2013). But due to adoption of new agricultural technology for more production the demands of these traditional varieties has become less. Each of the varieties has its own importance. Some having good scent, some may be of diseased resistant, some may have high protein content, more vitamins etc. The traditional

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rice varieties may contain a considerable genetic diversity that can serve as a source of germplasm for genetic improvement of cultivated varieties of rice. In general, diverse landraces traditionally cultivated by farmers around the centers of diversity and domestication of crops are considered as key natural resources (Pusadee *et al.*, 2009) important for maintaining the future food security. So the characterization and popularization of these varieties has become most essential for future crop improvement.

Bongaigaon (26°282 N and 89°962 E) (Figure 1) is the District Head Quarter located in Assam falls in the subtropical monsoon climatic zone. The average yearly rainfall is about 4632.2mm (source BGR, IOCL). A large number of paddy fields are present in the villages of Bongaigaon area. Though Bongaigaon is a commercial place where people belonging to different caste and community live together but the village areas are represented by people of particular caste and community. Except the city dwellers most of the villagers are cultivators and the main crops cultivated in these areas are rice which gives them livelihood. The taste as well as preference of rice varieties differs from caste to caste. So the cultivators of different community prefer to grow different rice varieties according to their choice. Again the environmental condition (*viz.* soil fertility, soil moisture, soil temperature) of these localities differ from one another. These as well as the different ethnic group living in different localities make the area rich in rice diversity.

With an aim to see the quality and productivity as well as traditional rice diversity in Bongaigaon area of Bogaigaon district a field study was made during the rice harvesting period of 2012 and 2013.

MATERIALS AND METHODS

The period of study was restricted to November, December and January (rice harvesting periods) of 2012 to 2013. Ten localities from Bongaigaon area of Bongaigaon districts were selected randomly (Figure 1). To collect the local name and use of each varieties farmer of different localities were communicated. Rice grains of different varieties were collected from all these localities and some phenotypic characters and Protein percentage were studied. The parameters were:

- Length of the plant
- Length of the spike
- Number of grains per spike

All these were studied using meter scale

- Protein concentration in grains were studied by Lowry's method.

RESULT AND DISCUSSION

During my field study I could find 43 different traditional rice varieties cultivated in Bongaigaon area of Bongaigaon district. Out of these only few of them are gaining prime attention for value-added rice farming. *Bora rice*, localy known as bonni dhan, characterized by high amylo pectin content, is a popular part of the daily breakfast in rural area as snacks, flat rice, puffed rice etc. It is also used for preparation of special rice beer by various ethnic groups of these localities. It is also used for preparation of other dishes for social and religious ceremonies. Different varieties of *Joha rice,* locally known as bhog dhan are found to cultivate here due to their use in religious ceremonies and also in preparation of sweet dishes. Some Sali varieties like *Panisali, Panati, boa rice* has great demands here in preparation of flat rice. *Dudhkalam* is also another rice variety used in preparation of breakfast item (muri).

During my field study I could find 7 different *Joha rice* (bhog dhan) *viz. kalabhog, Ghogubhog, Benibhog, Tulsibhog, Katharibhog, Kewabhog, Shialbhog*. Of these scented varieties *Kalabhog* and *Tulsibhog* were found to be the best. Like that 7 different Bora rice (bonni dhan) *viz. Nalbonni, Buribonni, Sahabonni, Anarasibonni, Bhogbonni, Pakhatibonni* were observed and all these varieties are glutinous having amylo pectin. Three different Boa varieties *viz. Dhepa boa, Kholsa boa* and *Kakoa boa* were observed and all these varieties are also slightly glutinous.

Regarding the length local variety *Baramdoi* was found to be the tallest (137.71 ± 13.54 cm) which was followed by *Pakhati bonni* (136.32 ± 10.02 cm)

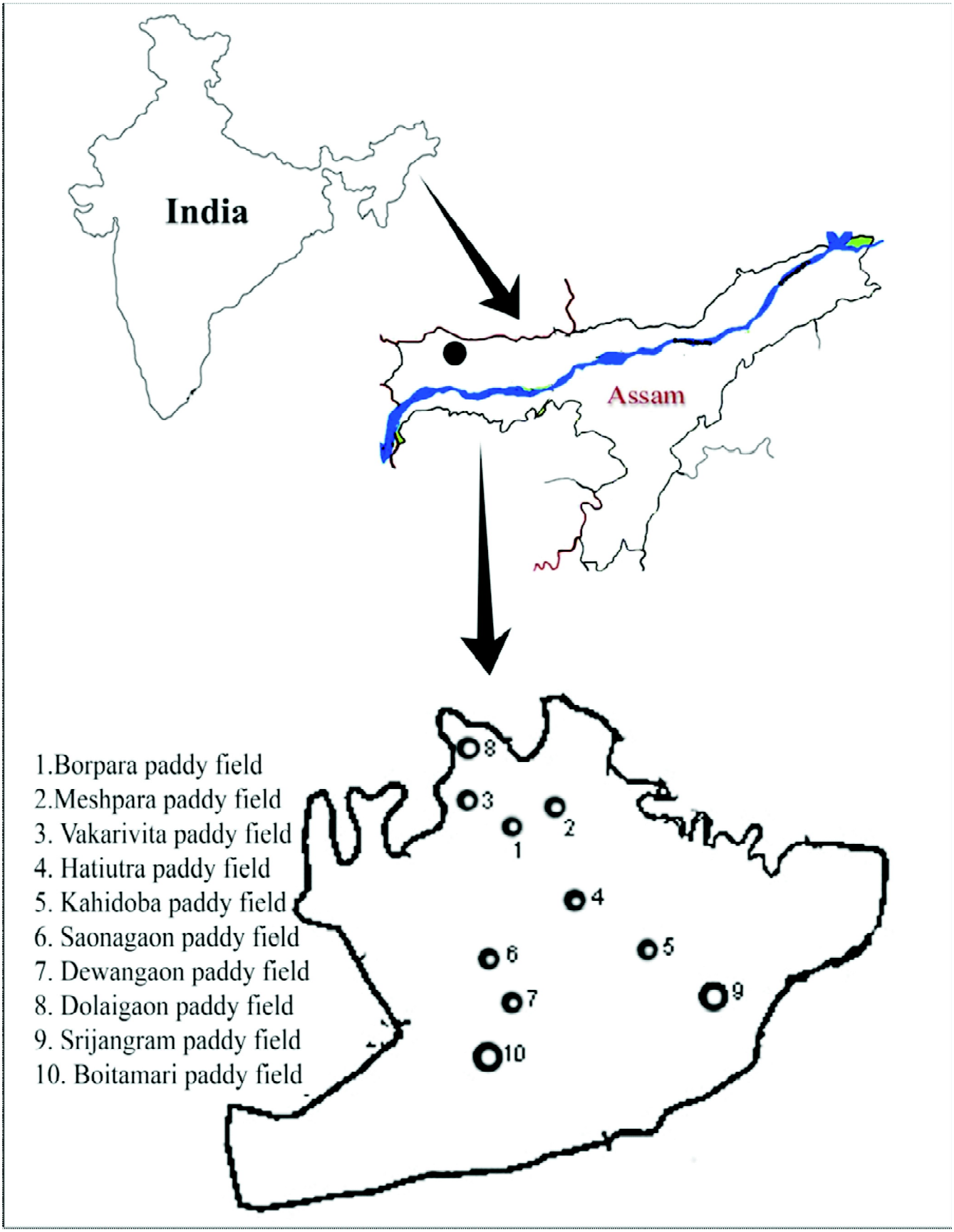

Figure 1: Different paddy fields of Bongaigaon area.

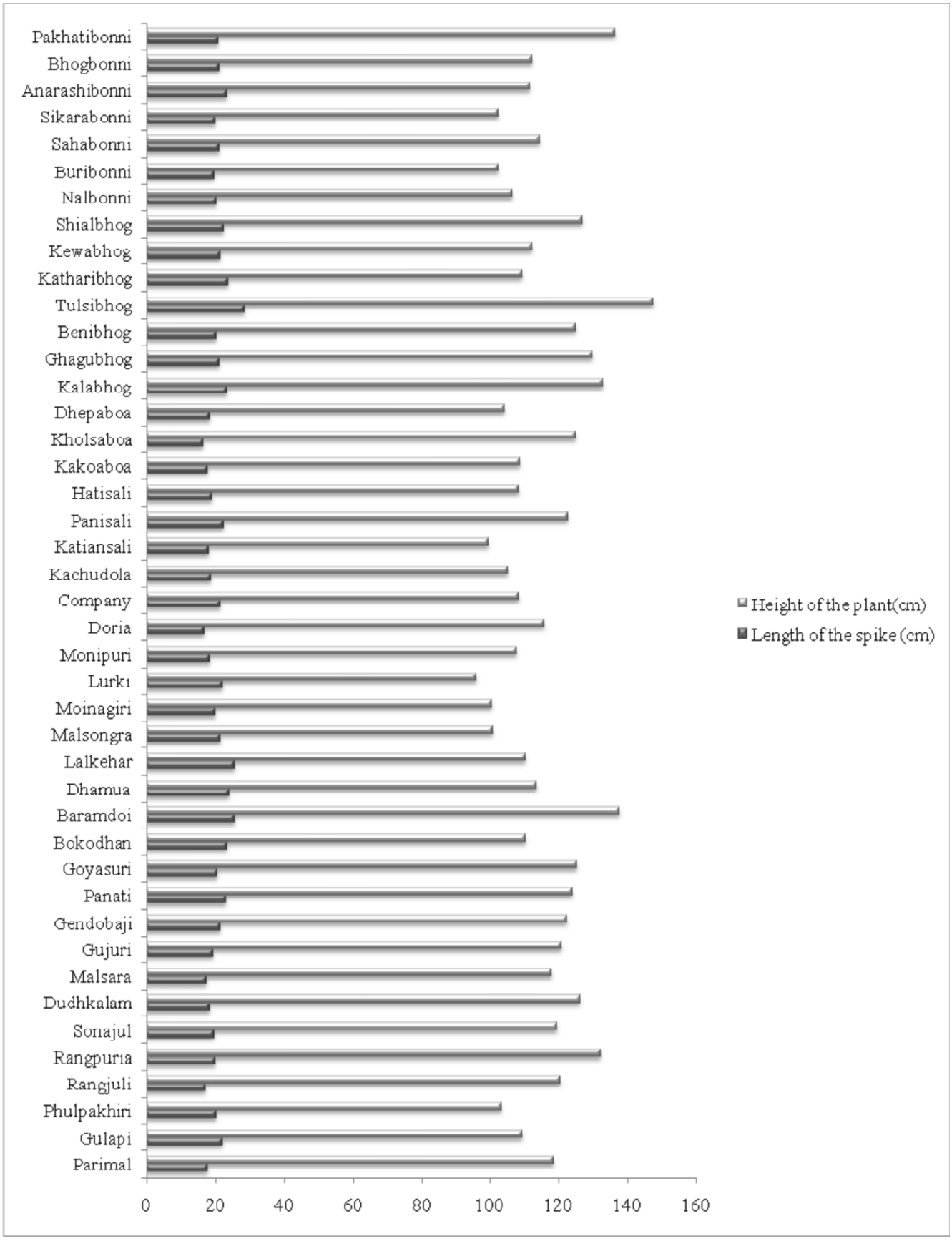

Figure 2: Height of the plants and length of the spike in different traditional rice varieties of Bongaigaon area.

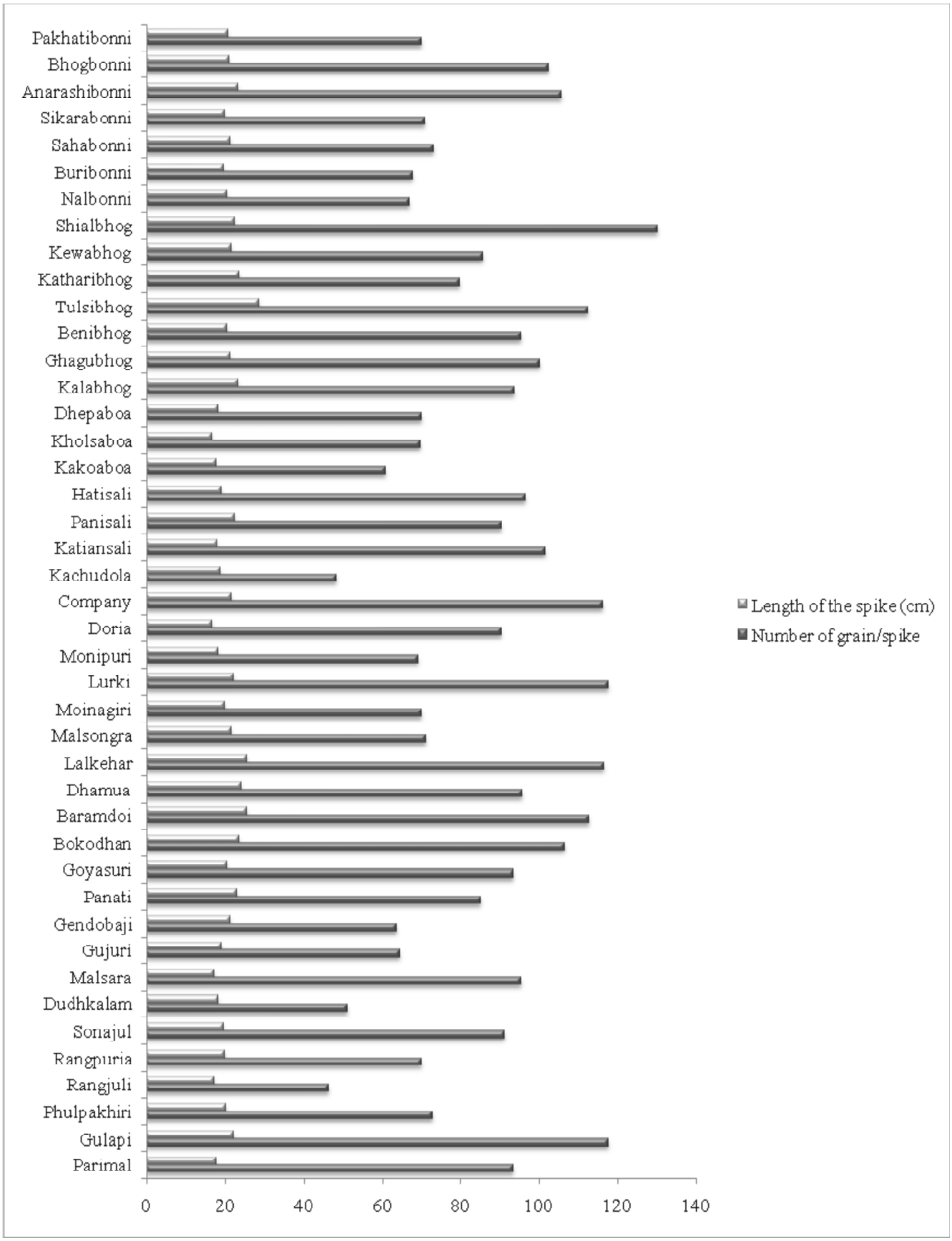

Figure 3: Length of the spike and number of grains per spike in different traditional rice varieties of Bongaigaon area.

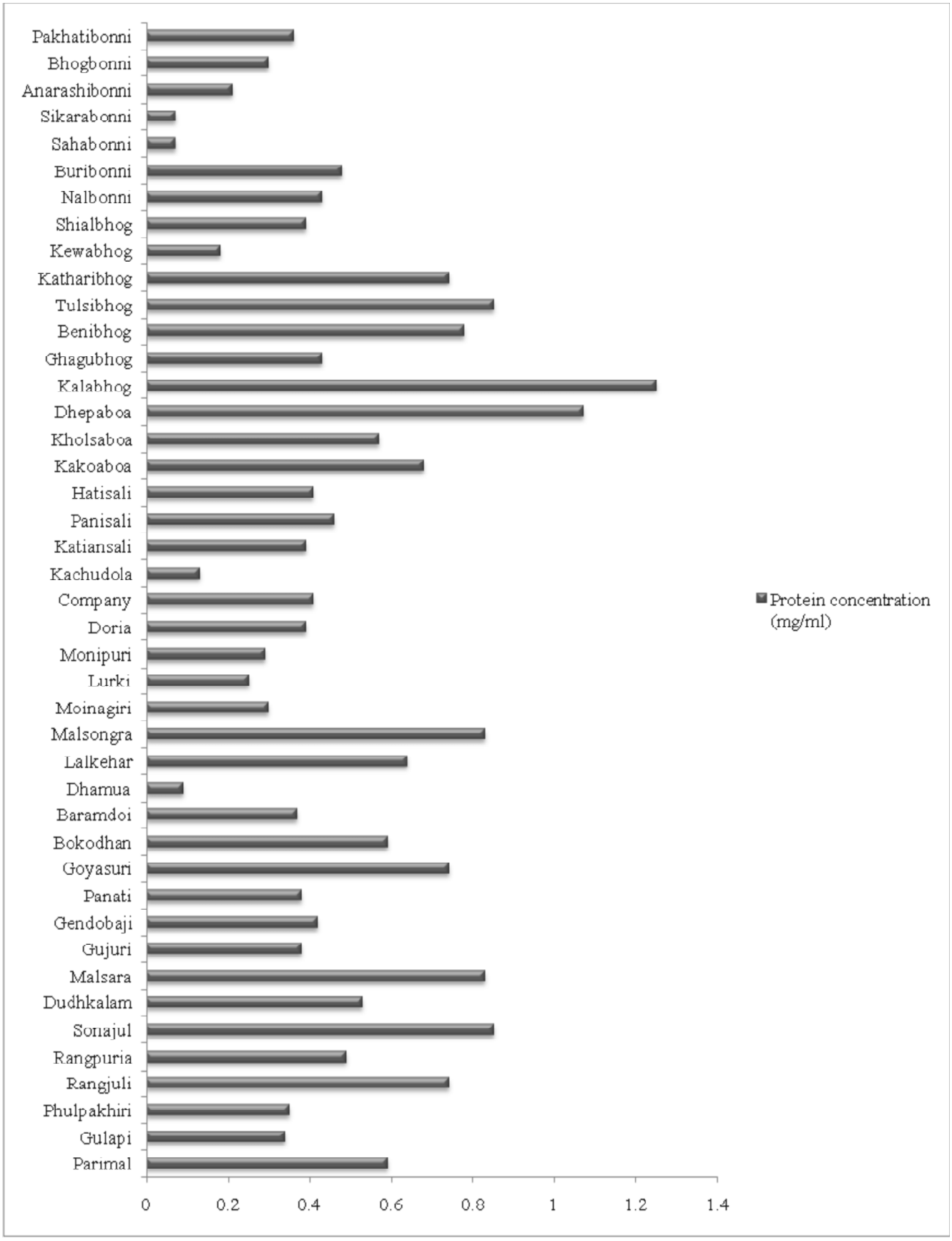

Figure 4: Protein content of grains in different traditional rice varieties of Bongaigaon area.

and *Kalabhog* (132.89 ± 9.53 cm). Length of the spike also varied according to varietal type. The longest spike was found in *Tulsi bhog* (28.53 ± 5.49 cm) and shortest in case of *kholsaboa* (16.57 ± 6.90 cm). Like that highest grain per spike was found in case of *Shialbhog* (130.26 ± 23.28) which were followed by *Lurki* (117.72 ± 21.05), *Gulapi* (117.72 ± 23.05), *Lalkehar* (116.60 ± 33.52) *Baramdoi* (112.68 ± 33)and *Tulsibhog* (112.49 ± 18.02) Table 1.

Table 2 shows the amount of Protein concentration and use of these different traditional varieties of rice cultivated in Bongaigaon area of Bongaigaon district. Highest protein concentration was observed in case of *Kalabhog* which was followed by *Dhepabowa, Tulsibhog* and *Sonajul*. From the figure 4 it is cleared that most of the bhog and bonni varieties are rich in protein concentration.

Table 1
Height of the plant, length of the spike, and number of grains per spike in different traditional rice varieties (*Oryza sativa* L.) cultivated in Bongaigaon area during the winter of 2012 and 2013

Sl. No.	*Varietal type (Local name)*	*Height of the plant(cm)*	*Length of the spike (cm)*	*Number of grain/spike*
1.	Parimal	118.65 ± 9.54	17.65 ± 3.45	93.34 ± 28.20
2.	Gulapi	109.51 ± 8.23	22.24 ± 6.17	117.72 ± 23.05
3.	Phulpakhiri	103.35 ± 7.66	20.33 ± 4.29	72.92 ± 21.44
4.	Rangjuli	120.45 ± 8.59	17.10 ± 4.29	46.50 ± 25.27
5.	Rangpuria	132.34 ± 12.26	19.80 ± 7.92	70.20 ± 19.27
6.	Sonajul	119.45 ± 8.34	19.64 ± 4.41	91.28 ± 26.84
7.	Dudhkalam	126.15 ± 13.28	18.20 ± 6.74	51.00 ± 19.54
8.	Malsara	118.06 ± 8.31	17.26 ± 3.46	95.34 ± 25.50
9.	Gujuri	120.85 ± 11.28	19.15 ± 8.54	64.58 ± 25.43
10.	Gendobaji	122.55 ± 10.22	21.46 ± 9.21	63.58 ± 21.48
11.	Panati	124.08 ± 11.88	23.02 ± 10.2	85.08 ± 22.66
12.	Goyasuri	125.24 ± 8.58	20.56 ± 9.28	93.42 ± 18.63
13.	Bokodhan	110.42 ± 10.47	23.50 ± 4.32	106.60 ± 8.86
14.	Baramdoi	137.71 ± 13.54	25.54 ± 4.30	112.68 ± 33.74
15.	Dhamua	113.423 ± 10.64	24.18 ± 5.02	95.69 ± 29.71
16.	Lalkehar	110.42 ± 10.47	25.50 ± 3.22	116.60 ± 33.52
17.	Malsongra	100.89 ± 8.39	21.67 ± 2.12	71.13 ± 29.15
18.	Moinagiri	100.54 ± 11.37	19.80 ± 7.72	70.20 ± 19.27
19.	Lurki	96.10 ± 10.27	22.24 ± 6.17	117.72 ± 21.05
20.	Monipuri	107.64 ± 11.46	18.26 ± 7.28	69.26 ± 19.55
21.	Doria	115.65 ± 9.45	16.65 ± 7.54	90.34 ± 28.02
22.	Company	108.51 ± 8.23	21.66 ± 5.35	116.42 ± 22.56
23.	Kachudola	105.23 ± 11.46	18.76 ± 6.71	48.42 ± 16.17
24.	Katiansali	99.49 ± 7.62	17.99 ± 4.87	101.62 ± 28.62
25.	Panisali	122.89 ± 12.83	22.32 ± 8.58	90.42 ± 25.47
26.	Hatisali	108.49 ± 7.62	18.99 ± 4.87	96.62 ± 28.62
27.	Kakoaboa	108.80 ± 11.78	17.80 ± 6.15	60.87 ± 29.27
28.	Kholsaboa	125.11 ± 12.29	16.57 ± 6.90	69.84 ± 15.23
29.	Dhepaboa	104.22 ± 13.35	18.22 ± 4.50	70.02 ± 22.37
30.	Kalabhog	132.89 ± 9.53	23.32 ± 4.88	93.82 ± 25.47
31.	Ghagubhog	129.65 ± 7.72	21.35 ± 4.92	100.02 ± 25.52
32.	Benibhog	125.06 ± 8.45	20.37 ± 4.02	95.42 ± 21.22
33.	Tulsibhog	147.54 ± 6.64	28.53 ± 5.49	112.49 ± 18.02
34.	Katharibhog	109.22 ± 9.45	23.66 ± 6.71	79.75 ± 25.02
35.	Kewabhog	112.22 ± 10.45	21.67 ± 6.75	85.75 ± 25.02
36.	Shialbhog	127.02 ± 9.73	22.5 ± 4.01	130.26 ± 23.28
37.	Nalbonni	106.58 ± 13.22	20.38 ± 6.12	67.07 ± 21.05
38.	Buribonni	102.51 ± 8.56	19.55 ± 6.37	67.94 ± 19.27
39.	Sahabonni	114.61 ± 8.26	21.32 ± 7.92	73.00 ± 21.26
40.	Sikarabonni	102.51 ± 12.54	19.88 ± 6.18	70.94 ± 19.33
41.	Anarashibonni	111.52 ± 10.66	23.41 ± 7.16	105.61 ± 21.92
42.	Bhogbonni	112.31 ± 9.14	21.05 ± 6.61	102.46 ± 23.06
43.	Pakhatibonni	136.32 ± 10.02	20.80 ± 6.45	70.10 ± 24.94

CONCLUSION

Though with rapid population growth as well as increase demands of food, the farmers of Bongaigaon area of Bongaigaon districts also have to adopt new agricultural technology for greater production, still they have not left the practice of cultivating traditional varieties. The 43 different traditional rice varieties have their own importance. Bhog varieties along with aroma qualities also rich in protein content. Sali varieties like *Lurki, Gulapi*, *Lalkehar* are rich in grain number. Bora rice (bonni variety) not only glutinous but also of medium ranged in protein content. Thus these traditional varieties cultivated in different localities of Bongaigaon by farmers of different ethnic group may form the initial material for selecting suitable parents for hybridization for economic and genetic studies.

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Table 2
Protein concentration and uses of different traditional varieties of rice (*Oryza sativa* L.) cultivated in Bongaigaon area during the winter of 2012 and 2013

SL No.	*Varietal type (Local name)*	*Protein concentration (mg/ml)*	*Uses of*
1.	Parimal	0.59	On cooking it is non sticky and Used for regular meal
2.	Gulapi	0.34	Used for regular meal
3.	Phulpakhiri	0.35	Used for regular meal
4.	Rangjuli	0.74	Used for regular meal
5.	Rangpuria	0.49	Used for regular meal
6.	Sonajul	0.85	Used for regular meal
7.	Dudhkalam	0.53	Breakfast item like flat rice and muri
8.	Malsara	0.83	Flat rice
9.	Gujuri	0.38	Takes time for cooking, Heavy to digest and Used as meal
10.	Gendobaji	0.42	Used for regular meal
11.	Panati	0.38	Flat rice and meal
12.	Goyasuri	0.74	Used for regular meal
13.	Bokodhan	0.59	Soft rice as breakfast item
14.	Baramdoi	0.37	Take time for cooking and Used as flat rice
15.	Dhamua	0.09	Heavy to digest and Used as meal
16.	Lalkehar	0.64	Heavy to digest and Used as meal
17.	Malsongra	0.83	Heavy to digest and Used as meal
18.	Moinagiri	0.30	Used for regular meal
19.	Lurki	0.25	Used for regular meal
20.	Monipuri	0.29	Used for regular meal
21.	Doria	0.39	Heavy to digest and Used as meal
22.	Company	0.41	Heavy to digest and Used as meal
23.	Kachudola	0.13	Heavy to digest and Used as meal
24.	Katiansali	0.39	For regular meal
25.	Panisali	0.46	Flat rice and regular meal
26.	Hatisali	0.41	Heavy to digest and Used as flat rice
27.	Kakoaboa	0.68	Takes time to cook and Used as flat rice
28.	Kholsaboa	0.57	Flat rice
29.	Dhepaboa	1.07	Flat rice
30.	Kalabhog	1.25	Have a typical aroma and Used for preparation of sweet dishes in ceremonies and festivals.
31.	Ghagubhog	0.43	Sweet dishes
32.	Benibhog	0.78	Sweet dishes
33.	Tulsibhog	0.85	Sweet dishes
34.	Katharibhog	0.74	Sweet dishes
35.	Kewabhog	0.18	Sweet dishes
36.	Shialbhog	0.39	Sweet dishes
37.	Nalbonni	0.43	Sticky and Used as snacks, puffed rice etc. It is also Used in preparation of rice beer
38.	Buribonni	0.48	Rice beer, breakfast item
39.	Sahabonni	0.07	Rice beer, breakfast item
40.	Sikarabonni	0.07	Rice beer, breakfast item
41.	Anarashibonni	0.21	Rice beer, breakfast item
42.	Bhogbonni	0.30	Rice beer, breakfast item
43.	Pakhatibonni	0.36	Rice beer, breakfast item

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