



Research Article

Farmers' Preferences of Improved Wheat Varieties in Wheat Subsector Kailali, Nepal

Prashant Bhatt^{1*}, Pratibha Bist¹, Laxmi Narayan Ojha¹

¹Agriculture and Forestry University, Chitwan, Nepal

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*Corresponding author

Prashant Bhatt,

Agriculture and Forestry University, Chitwan, Nepal

Email: robinhoodpb2015@gmail.com

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Abstract

Kailali is the second highest district regarding wheat production and area coverage. A study was carried out in the Kailali district for preference of farmers on different wheat varieties that were being cultivated in the district. The objective of the study was to assess farmers' preference and perception on the different improved wheat varieties in the area. Five commonly grown wheat varieties and seventeen important wheat varietal traits were selected through focus group discussion, key informant interview and preliminary survey. Sixty households were selected for face-to-face personal interview, twelve for each selected variety, at random from Ghodaghodi Municipality, Gauriganga Municipality and Kailari Rural Municipality of Kailali. The weightage of the seventeen selected traits were determined using an online survey conducted among individuals from different designation with the agricultural background who were well known about wheat cultivation practices in Kailali district. Yield, flour quality and tillering were found to be the trait of higher weightage and stem thickness was the trait of lowest weightage. The preferences of the farmers were measured using wheat preference index (WPI). The varieties Vijay, NL-971, HD-2967, Gautam and Aditya were ranked as I, II, III, IV and V respectively. The incorporation of farmers' preferred traits in future wheat varieties would increase the likelihood of adoption of the varieties. Similarly, proper participatory field trial of new improved wheat varieties would also help in the selection of the suitable varieties in the area concerning the farmers' criteria of selection.

Introduction

Wheat occupies 3rd position among the three major cereal crops in its area coverage and production in Nepal. Among the 43 major agricultural commodities, which account for greater than 95 percent of the AGDP, wheat contributes to 6.7 percent (MoAD, 2016). Kailali is the second highest district in wheat production after Dhanusha with productivity of 3.12 ton/ha, greater than the national average (2.85 ton/ha) (MoALD, Statistical Information on Nepalese Agriculture, 2020). Kailali is the potential district for the commercialization of wheat subsector.

Government of Nepal has recommended 32 different improved wheat varieties for different ecological regions till date (MoALD, Agriculture Diary, 2020). 16 varieties among the registered varieties are recommended for Terai region of Nepal.

Gautam, Bhrikuti, Vijay, Aditya, NL-971 and WK-1204 are the most popular wheat varieties in Nepal. Use of the modern improved varieties and farmers' awareness about management practices has resulted to the increase in the wheat productivity from 1.18 ton/ha in 1984/85 to 2.41 ton/ha in 2015/16 (NWRP, 2017). Farmers of the country

have limited varietal choices and mostly they use varieties that are readily available in the locality irrespective of the research recommendations and advisory. Moreover, information on farmer's knowledge as well as perception regarding the improved wheat varieties are also lacking, which widens the gap between varietal needs and research priorities. The insufficient evaluation and selection of varieties in our country has lagged us behind in developing a variety with higher yield potential (Subedi, Sharma, Poudel, Adhikari, & KC, 2018).

Farmers give more importance to the yield attribute of the improved crop varieties but they will not select a particular variety unless it fulfills their need in certain other traits which they consider important (Asrat, Yesuf, Carlsson, & Wale, 2010). The acceptance of the variety is the function of farmers' perception towards the variety. But the farmers' preference and perception about the multiple traits of the varieties has given a negligible importance in the selection of a variety which can help in determining most preferred variety along with the most important trait of preference for the variety. Those traits of choice can be utilized in the breeding purposes for development of the variety. The decision for the adoption of modern rice varieties is determined by their knowledge and perception about the variety (Zinnah & Adesina, 1993) and also by the variables of farmers' socio-demographic characteristics (Voh, 1982).

Nepal is behind the development of promising improved varieties so there is the need of proper evaluation of the variety in the research field and participatory selection of the variety in the farmer's field. A research in rice concluded that, not only yield, grain quality and other traits like disease and pest tolerance has positive influence on the varietal preference. Another study in Syria found that 96 percent of the farmers to be satisfied with commercial modern wheat varieties due to their adaptation to local condition and good combination of agronomic traits (Bishaw, Struik, & Gastel, 2011). After the implementation of the Prime Minister Agri-Modernization Project, multiple wheat seed distribution and multiplication programs were conducted in the Kailali district but there is a need for proper evaluation of the performance of the existing varieties and their acceptance among the farmers.

Materials and Methods

Study Site

Kailali, a part of province 7 in Terai plain, is one of the 77 districts of Nepal. The geographical coordinate for Kailali district is 28° 41' N and 80° 52' E. The study area is within the district in the regions designated as the wheat superzone subsector by Prime Minister Agri-Modernization Project (PMAMP), Nepal. It includes 17 wards of 3 different local levels of federal government of the district viz. Ghodaghodi Municipality, Kailari Rural Municipality and Gauriganga Municipality.

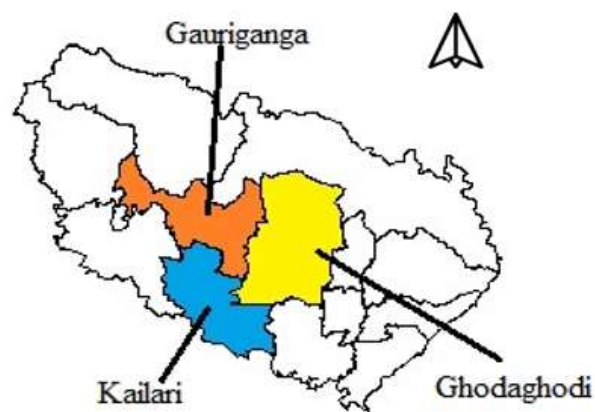


Fig. 1: Map of Kailali district showing study site

Research Instruments and Design

Preliminary survey was helpful to understand the socio-demographic status and wheat cultivation practices in the study area. FGD was conducted to identify the five major wheat varieties that were being cultivated in the study area. 17 most important wheat varietal traits for the farmers were also identified. Experienced wheat growing farmers were selected purposively through key informant interview for each of the wheat variety selected. In total 60 respondents were selected, 12 for each wheat variety. With the help of a semi-structured questionnaire, socio-demographic characteristics and rating for each of the selected trait of the variety were known.

Weightage of The Selected Traits

For the purpose of identifying the importance of each selected trait with respect to each other, an online survey was also conducted with help of google form. The respondents were the individuals from different designation with agricultural background viz. Farmers, University lecturer/researcher, Government officials, Private sector officials and Student researchers. They were well known about the wheat cultivation practices in the Kailali district. In total 16 responses were collected after each of the traits were rated according to the importance of the trait from farmers point of view. Traits were rated from 1 to 10, 1 being most important and 10 being most important among other selected traits.

Data Analysis

The collected data were analyzed using simple descriptive statistics to characterize and summarize the respondents as well as their responses. MS-Excel and SPSS ver.20 were used for the analysis of the data.

The average weightage of each of the wheat varietal trait was determined as,

$$M_j = \frac{\sum_{r=1}^p Q_{jp}}{\sum_{j=1}^{17} \sum_{r=1}^p Q_{jp}}$$

, where

M_j = Average weightage of j^{th} trait of wheat

Q_{jp} = Rating of the j^{th} trait by p^{th} respondent

j = trait of wheat ranging from 1 to 17

r = number of respondents ranging from 1 to p

Indexing of The Score

Total obtained score for the variety was further analyzed using Wheat Preference Index (WPI). Following Sharma, et al. (2017) WPI was derived as given below:

$$WPI_i = \frac{\sum_{k=1}^n \sum_{j=1}^{17} W_{ij} X_{ijk}}{\sum_{k=1}^n}$$

where,

WPI = Wheat Preference Index for i^{th} variety

W_{ij} = weightage of j^{th} characteristic of the i^{th} wheat variety,

X_{ijk} = Farmers preference score assigned to j^{th} characteristic of i^{th} variety by k^{th} farmer,

i = wheat variety ranging from 1 to 5,

j = characteristic of wheat variety ranging from 1 to 17,

k = number of respondent farmers ranging from 1 to n .

Result and Discussion

The household head of the respondents were 90 percent male with an average age of 45.88 yrs. Highest percentage of the household head were illiterate (25%). Most of the family were joint family type and most of them (90%) had

agriculture as their major occupation. The region was found to be dominated by Janjati (60%); most of them Tharu. The farming system of the study were integrated with livestock rearing which indicates the importance of the wheat by-products like straw for the livestock purposes. The average wheat cultivated area per household was found to be 0.7 ha.

Individual Weightage of Wheat Traits

The individual weightage of the selected traits resulted that yield per hectare had the highest weightage of 0.0698 and straw thickness obtained the lowest weightage (0.0488). Flour quality (0.066) and Tilling capacity (0.064) were also found to be important traits of wheat. Wheat bread in the evening as a daily consumption pattern for Tharu (Chaudhary, 2019) indicates the importance of the flour quality of wheat. The other traits with their weightage are shown in Fig. 2.

Wheat Preference Index

The Wheat Preference Index for Vijay was 3.61 and for NL was 3.47 Similarly, the WPI for HD-2967, Gautam and Aditya were found to be 3.43, 3.39 and 3.38 respectively. Therefore, according to the Wheat Preference Index obtained by each of the variety, the most preferred variety was Vijay followed by NL971, HD2967, Gautam and Aditya. But according to the potential yield, varieties Aditya (4.79 t/ha), NL-971 (4.53 t/ha), Vijay (4.45 t/ha) and Gautam (3.4 t/ha) can be ranked as I, II, III and IV (MoALD, Agriculture Diary, 2020). And HD-2967 was observed with the yield of 5.59 t/ha (Sachan, Verma, Sachan, & Pyare, 2019).

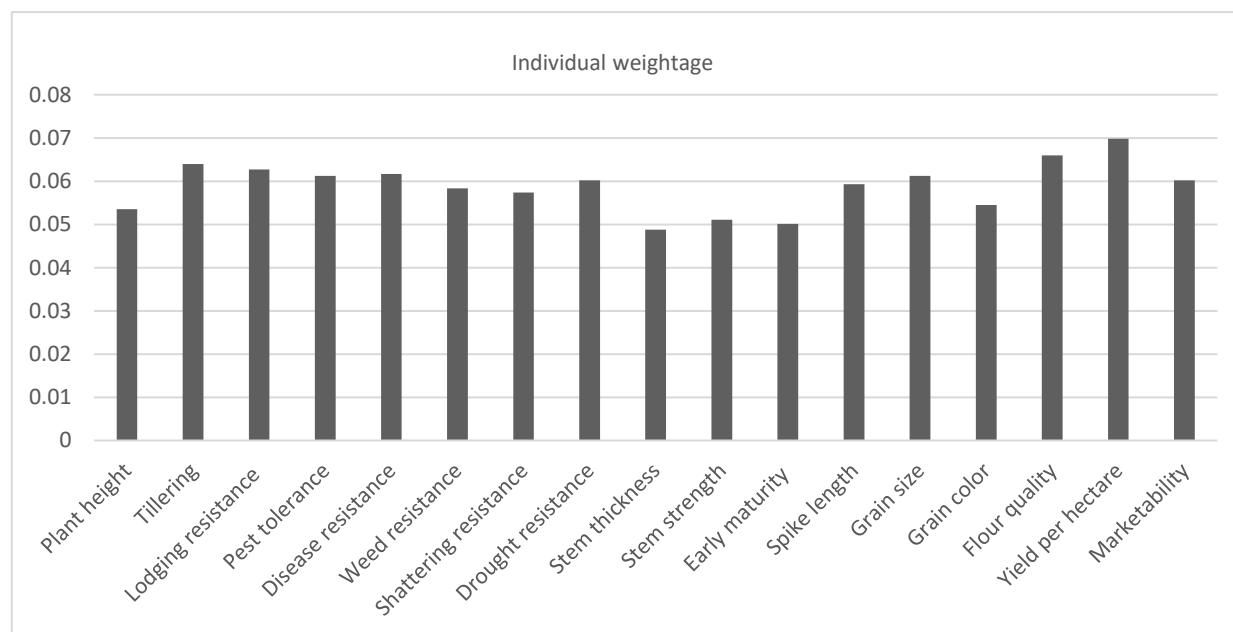


Fig. 2: Weightage of the selected traits of wheat varieties

Table 1: Weighted score and wheat preference index (WPI) of selected wheat varieties

| Varietal Characteristics | Individual weightage | Vijay | Aditya | NL971 | Gautam | HD2967 |
|--------------------------|----------------------|---------------|----------------|----------------|----------------|----------------|
| Plant height | 0.0535 | 2.675 | 2.6215 | 2.996 | 2.675 | 2.8355 |
| Tillering | 0.064 | 2.56 | 1.792 | 2.24 | 2.56 | 2.88 |
| Lodging resistance | 0.0627 | 3.3231 | 2.7588 | 2.8215 | 2.6961 | 3.2604 |
| Pest tolerance | 0.0612 | 2.5704 | 2.5092 | 2.5092 | 2.3868 | 2.448 |
| Disease resistance | 0.0617 | 2.468 | 2.468 | 2.4063 | 2.2829 | 2.3446 |
| Weed resistance | 0.0583 | 1.2826 | 1.166 | 1.166 | 1.166 | 1.3409 |
| Shattering resistance | 0.0574 | 2.4682 | 2.1812 | 2.5256 | 2.4682 | 2.6978 |
| Drought resistance | 0.0602 | 2.5284 | 2.3478 | 2.6488 | 2.2274 | 2.1672 |
| Stem thickness | 0.0488 | 2.0496 | 1.8056 | 1.9032 | 1.7568 | 1.9032 |
| Stem strength | 0.0511 | 2.3506 | 2.0951 | 2.5039 | 2.4528 | 2.2484 |
| Early maturity | 0.0501 | 1.7535 | 1.8036 | 1.8036 | 1.8036 | 1.3527 |
| Spike length | 0.0593 | 2.6092 | 2.7278 | 2.1941 | 2.6685 | 2.5499 |
| Grain size | 0.0612 | 3.1824 | 3.3048 | 3.06 | 2.9376 | 2.9376 |
| Grain color | 0.0545 | 2.6705 | 2.7795 | 2.725 | 2.943 | 2.3435 |
| Flour quality | 0.066 | 3.366 | 2.838 | 2.97 | 2.442 | 2.046 |
| Yield per hectare | 0.0698 | 2.5128 | 2.7222 | 2.3034 | 2.3034 | 3.0014 |
| Marketability | 0.0602 | 2.9498 | 2.6488 | 2.8896 | 2.9498 | 2.8294 |
| Total | | 43.320 | 40.5699 | 41.6662 | 40.7199 | 41.1865 |
| WPI | | 3.6100 | 3.3808 | 3.4721 | 3.3933 | 3.4322 |
| Rank | | I | V | II | IV | III |

The analysis of preference weighted scores, as given in the table 1, for each characteristics of the wheat varieties resulted that Vijay was preferred for most of the characteristics. Flour quality (3.37), Pest tolerance (2.57), and stem thickness (2.05) were the most desired characteristics of Vijay. Similarly, NL-971 (3.4721) is ranked II with the preference trait of drought tolerance. This signifies the importance of the NL-971 variety in the years with very low precipitation. Aditya (3.38) and Gautam (3.39) were least preferred because of low tillering capacity and poor flour quality respectively. Likewise, HD-2967 was preferred for its higher yield and high tillering capacity but it had bad flour quality. The variety was being imported from India by the farmers due to open border. So, HD-2967 can be released by government of Nepal as a commercial variety because it had highest preference for yield per hectare and tillering capacity.

Conclusion

The study determined that farmers' preference towards a variety was not only determined by its yield but also by other traits of importance. The study has an implication in the farmer-oriented extension and research program for suggesting farmers the most suitable variety in the area. Focusing to the farmers' preferred traits during the development and distribution of the wheat varieties would increase the likelihood of adoption of the varieties.

Author's Contribution

All authors contributed equally during all stages of research work and manuscript preparation & approval.

Conflict of Interest

The authors declare that there is no conflict of interest with present publication.

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