

# Trend and Pattern of Cereal Crops: Production, Productivity and Area Coverage in Nepal

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## Abstract

*This study conducted to examine growth trends and pattern in area, production and productivity of major cereal crops over the six fiscal years. Time series data of cereal crops coverage of annual yield were used for the study. This study was based on descriptive nature and used secondary sources of information on production, productivity and area coverage of major cereals (Paddy, Maize, Wheat, Millet, Buckwheat and Barley) covering the six fiscal years (2011/12-2016/17) data. Trends of crop's productivity were analyzed using graphical methods. Ratio and percentage were used to measure productivity (yield) growth rate of the selected crops of study. The yielding trend of cereal production is not satisfactory in Nepalese economy. Pattern of agricultural production in Nepal is affected by multiple factors including rugged topography, monsoon, insignificant investment in infrastructure, and research and development. Production and productivity would be helpful to develop the future plans and take the appropriate decisions to uphold the situation for the sustainability in food production.*

**Key Words:** Crops Diversification, Production, Productivity, Growth Rate and Growth Trend

## 1. Introduction

Globally many initiatives have been made in agriculture sector for betterment in farming technology and crop management practices. This is aimed to increase the crop productivity to ensure food security of growing population (Khanal, 2015). Agriculture has decisive role to economic growth. It accounted for one third of the global gross domestic production. By nature it is an important foundation of livelihoods in developing countries, providing ways of life for billions of people, many of them poor. Majority of Nepalese people including small farmers, migrant workers, herders, fishers, artisans, women and indigenous peoples are depend on subsistence rudimentary agriculture for their survival.

Meeting this food security goal has becoming the major challenge in Nepal. Nevertheless rural poverty remains rigidly high, even with rapid growth in the rest of the economy. Urban-rural income gaps lean to rise as non-agricultural growth accelerates, creating major social tensions as expectations for better lives remain unfulfilled for a

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majority of the rural people (Tacoli, 2006). Global food production has increased by well over 130 percent since the 1960s, yet the fact that almost 78 percent of countries that report child malnutrition are food-exporting countries dramatically illustrates a ‘paradox of plenty’ (Mittal, 2006).

The majority of land in South Asia is used for agriculture. Currently, more than 260-million-hectare land is used for it and it contributes about 15 percent of the total Gross Domestic Product (GDP) and employing more than 50 percent of the population in the region (WB, 2015). In Nepal, more than 65 percent population is engaged in the agricultural sector (MoAD, 2017). The region has made tremendous progress in last four decades in food production and availability, yet a quarter of the world’s hungry and 17 percent of the world’s undernourished population lives there (FAO, 2015a). South Asian countries are very vulnerable to current as well as future climatic risks because of its large population, food demand and extreme poverty. Owing to this reality, there is an urgency to boost the adaptive capacity of the region’s agriculture to a changing climate.

The term ‘crop’ covers a very broad range of cultivated plants. The decline in the share of agriculture in total production is taking place at different speeds. It has different challenges within and across the regions. Although, agricultural investments and technological innovation are now, enhancing production and productivity of cereal crops. Food losses and waste assert a significant proportion of agricultural output, and reducing them would lessen the need for production increases (FAO, 2017).

In light of agriculture development the conservation model focused on the evolution of an increasingly complex use of organic manures, labour-intensive cropping technique in the form of material facilities to more effectively use land and water resources (Udemezue and Osegbue, 2018). This model was the best practice to intensification of agricultural production that was available to the most farmers all over the world. The pace to agricultural development, according to diffusion approach, is through more efficient and effective broadcasting of technical knowledge and a narrowing of the productivity differences among tillers and areas. The diffusion of better cultivation and harvesting practices was a major source of productivity growth even in pre-modern societies. Even in nations with well-developed agricultural innovative research systems a significant effort is still devoted to the testing and alteration of farmers’ innovations. The ultra-neoclassical position was, of course, first championed by T.W. Schultz in relation to backward agriculture. Schultz's (1964) world of traditional agriculture is one where technology is stationary and population also is somehow stationary. But Schultz demands more out of traditional agriculture because it has higher efficient. On behalf of traditional agriculture, Schultz' emphasized that the training and schooling to farmers who sincerely involved in production since early time.

Throughout the world, cereal grains are considered as the major component of human diet for the source of carbohydrate and energy from the beginning of human civilization. Indeed, cereal crops are directly responsible for providing the more than half calories consumed by human ([Vishal, et al., 2017](#)). In developing countries, agriculture provides the foundation for a major share of employment and constitutes the main source of livelihood for a large portion of the population. By the late 1990s, on average, more than 75 percent of the labour force in the least developed and other low-income countries was engaged in the agricultural sector. The importance of agriculture also has implications for other sectors of the economy (UNEP, 2013). Agriculture has traditionally been and remains a very imperative segment in the national economy. Majority of the farmers who are involved in the agriculture sector are old females predominantly employed in subsistence small farms and engaging in a supplementary non-agricultural activities seeking to guarantee some additional source of income. This manuscript can logically be significant to the stakeholders, policy makers and concerns authorities to examine the current trend and pattern of cereal production and making the future plan as well.

## **2. Methods**

This paper was based on a trend analysis of time series data specially focused on production and productivity for cereals crops grown in Nepal. This study has deeply rooted to explore the production trend of cereal crops within the six fiscal years of Nepal and described the trend and pattern of agriculture. The paper was accomplished based on secondary sources of information. The data of six cereal crops (2011/12 to 2016/17) were gathered from the various issues of 'Statistical Information on Nepalese Agriculture', Ministry of Agricultural Development, Nepal (MoAD, 2018). Legal documents were obtained by visiting offices of the concerned governmental authorities and their official website. Moreover, the data for this study has gleaned from books, journals, plans, budget, policies, strategy and reports published by governmental, private and non-governmental organizations. Basic statistics such as tabulation, percentage analysis and time series have been used for analyzing the data using Ms-excel and Ms-words.

## **3. Results and Discussion**

### **Area Coverage**

Coverage trend implies to size of land used to produce cereal crops. The size of land is not sufficient indicator of agriculture development and modernization but varieties of equipment, machine, skill, knowledge, market, incentives to tiller and investigation on it.

**Table 1: Trend of Area Coverage by Cereals in Nepalese Agriculture(Area in Hectare)**

Year	Paddy	Maize	Millet	Buckwheat	Wheat	Barley
2011/12	1531493	871387	278030	10339	765317	27966
	2.33 %	-3.84 %	3.04 %	0.33 %	-0.28 %	-1.73 %
2012/13	1420570	849635	274350	10681	759843	28989
	-7.24 %	-2.49 %	-1.32 %	3.30 %	-0.71 %	3.65 %
2013/14	1486951	928761	271183	10510	754474	28173
	4.67 %	9.31 %	-1.15436	-1.60 %	-0.70 %	-2.81 %
2014/15	1425346	882395	268,050	10819	762373	28053
	-4.14 %	-4.99 %	-1.16 %	2.94 %	1.05 %	-0.43 %
2015/16	1362908	891583	266799	10842	745823	28361
	-4.38 %	1.04 %	-0.47 %	0.21 %	-2.17 %	1.12 %
2016/17	1,552,469	900,288	263,596	11,090	735,850	27,370
	13.90%	0.97%	-1.200	2.28%	-1.33%	-3.49%

Source: MoAD, 2018

The area is measure in hectare. In fiscal year 2011/12 the area coverage by six dominance crops was 1531493, 871387, 278030, 10339, 765317 and 27966 ha respectively. In fiscal year 2011/12 the area coverage by paddy, millet and buckwheat are increased by 2.33 percent, 3.04 percent and 0.33 percent with respectively as compared to previous fiscal year 2010/11. In fiscal year 2011/12 the area coverage by six dominance crops was 1531493, 871387, 278030, 10339, 765317 and 27966 ha with respectively. Area under paddy cultivation has decreased by 4.38 percent in current fiscal year 2015/16. Similarly, area coverage by millet and wheat has also decreased by 0.47 percent and 2.17 percent with respectively in fiscal year 2015/16. In fiscal year 2015/16, the coverage area under the maize, buckwheat and barley was increased by 1.04 percent, 0.21 percent and 1.12 percent respectively. In fiscal year 2016/17 the trend area coverage trend is not favourable. The area for paddy is significantly increased by 13.90 percent whereas; maize and buckwheat are also increased but very nominally by 0.97 percent and 2.28 percent respectively. On the other hand, the area coverage by barley, millet and wheat is decreased (Table 1).

## Production

In Nepal about 80 percent agriculture production is occupied by cereal crops. There is no uniformity in the trend of cereal crops production in Nepalese economy. Paddy, Maize, Millet, Buckwheat, Wheat and barley are the major dominance cereal crops.

**Table 2: Trend of Cereal Production in Nepalese Agriculture**(*Production in Metric Ton*)

FY	Paddy	Maize	Millet	Buckwheat	Wheat	Barley
2011/12	5072248	2179414	315067	10021	1846142	34830
	13.72%	5.41%	4.08%	13.34 %	5.74 %	15.17 %
2012/13	4504503	1999010	305588	10056	1882220	36973
	-11.19 %	-8.27 %	-3.008 %	0.34 %	1.95 %	6.15 %
2013/14	5047047	2283222	304105	10335	1883147	34824
	12.04 %	14.21 %	-0.48 %	2.77 %	0.049 %	-5.81 %
2014/15	4788612	2145291	308488	10870	1975625	37354
	-5.12 %	-6.04 %	1.44 %	5.18 %	4.91 %	7.27 %
2015/16	4299079	2231517	302397	11641	1736849	32801
	-10.22 %	4.02 %	-1.97 %	7.08 %	-12.09 %	-12.18 %
2016/17	5,230,327	2,300,121	306,704	12,039	1,879,191	30,510
	21.66%	30.7%	1.12%	3.41%	8.19%	-6.98%

Source: MoAD, 2018

The cereal crops (paddy, maize, wheat, millet, Buckwheat and barely) constitute the major food items of the Nepalese people. In fiscal year 2011/12 the total paddy production was 5072248 metric ton which was increased by 13.72 percent as compared to fiscal year 2010/11 and in subsequent years except the fiscal year 2013/14 (increased by 12.04 percent); the trend was moved towards decreasing way. As compare to fiscal year 2010/11 maize, millet, buckwheat, wheat and barley were increased by 5.41 percent, 4.08 percent, 13.34 percent, 5.74 percent and 15.17 percent with respectively in fiscal year 2011/12. In fiscal year 2012/13 maize and millet were decreased by 8.27 percent and 3.008 percent respectively but buckwheat, wheat and barley were increased by 0.34 percent, 1.95 percent and 6.15 percent respectively as compare to fiscal year 2011/12. In fiscal year 2014/15, the Millet, Buckwheat, wheat and barley increased by to 1.44 percent, 5.18 percent, 4.91 percent and 7.27 percent with respectively but in the same year paddy and maize both has been decreased by 5.12 percent and 6.04 percent respectively. In fiscal year 2015/16 maize

and buckwheat are increased by 4.02 percent and 7.08 percent respectively and remaining crops are decreased. In fiscal year 2016/17 except barley (it is decreased by 6.98 percent) other cereal crops are successively increased (Table 2).

### Yielding Trend

While analyzing the trend of cereal crops, it is necessary to incorporate to productivity ratio. Basically, it is defined by amount of production in Kg/hectare.

**Table 3: Yielding Trend of Cereals in Nepalese Agriculture (Yield in Kg/hectare)**

FY	Paddy	Maize	Millet	Buckwheat	Wheat	Barley
2011/12	3312	2501	1133	969	2412	1245
	11.10 %	9.64 %	0.98 %	12.93 %	6.02 %	17.12 %
2012/13	3171	2353	1114	941	2477	1275
	-4.25 %	-5.91 %	-1.67 %	-2.88 %	2.69 %	2.40 %
2013/14	3394	2458	1121	983	2496	1236
	7.03 %	4.46 %	0.62 %	4.46 %	0.76 %	-3.05 %
2014/15	3360	2431	1151	1005	2591	1332
	-1.02 %	-1.10 %	2.63 %	2.17 %	3.82 %	7.72 %
2015/16	3154	2503	1133	1074	2329	1157
	-6.11 %	2.95 %	-1.51 %	6.86 %	-10.14 %	-13.15 %
2016/17	3,369	2,555	1,164	1,086	2,554	1,115
	6.81%	2.077%	2.73%	1.11%	9.66%	-3.63%

Source: MoAD, 2018

In fiscal year 2011/12 the productivity of paddy per-hectare cultivated land was 3312 Kg and increased by 10.10 percent as compared to fiscal year 2010/11 and in subsequent year the trend was seen as much as fluctuated. The trend was gradually decreased in subsequent fiscal years except fiscal year 2013/14 (increased by 7.03 %). In fiscal year 2011/12, 2013/14 and 2015/16 the productivity trend of maize was significantly increased by 9.64 percent, 4.46 percent and 2.95 percent, respectively. Meanwhile the other fiscal years, the trend was not proper in state. The productivity of millet also shows the similar trend as like other crops into different fiscal year. As compared to other crops, the yielding trend to buckwheat was seen somehow satisfactory. Except fiscal year 2012/13 (decreased by 2.88 %), the yielding trend of buckwheat has been increasing. Except the fiscal year 2015/16 (decreased by 10.14 %), the yielding trend of wheat was significantly increased as

compared the preceding fiscal years. Another dominance crops in Nepalese agriculture is barley. Its trend also not in proper condition. Within the five fiscal years, the productivity trend of barley was increased within three fiscal years (2011/12, 2012/13 and 2014/15) and the fiscal years 2013/14 and 2015/16 was decreased by 3.05 percent and 13.15 percent, respectively. In fiscal year 2016/17, except barley (it is decreased by 3.63 %) other cereals crop's yielding trend is rising (Table 3).

#### **4. Conclusion and Discussion**

This paper examined the trends in area, production and productivity of major cereal crops in Nepal over the six fiscal years 2011/12 to 2016/17. The declining trend in area, production and productivity of major cereal crops has been a cause of worry and was emphasized as threat to food security in the economy. There is no unanimous in the trend of cereal crops production, productivity and area coverage. The trend and pattern of cereals crops in Nepal have not been stable since the Nepalese production system was seriously affected by the mountainous and rugged topography including based on monsoon and insignificant investments in research and infrastructure development, particularly irrigation. Due to the low productivity of agriculture, active labour forces shift toward the alternative source of livelihood namely foreign employment which leads to labour shortage, and this becoming the vital cause for decreasing trend in the production of major cereal crops. Increasing cereal crop productivity through the application of modern science to agriculture has been most successful in land-scarce economies, particularly in Asia (Prabhu and Heisey, 1999). Thus it is necessary to strongly apply the modern science and technology in agriculture sector. Therefore, efforts should be made to enhance the productivity of the area under cereals cultivation to achieve higher production and productivity through increasing the use of improved seeds; technology transfer, application of getting-better technologies and tools in order to reduce food insecurity as well as economic problems.

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