

POTATO CROP AND ITS ROLE IN POVERTY ALLEVIATION IN NEPAL

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ABSTRACT

Agriculture is the backbone of Nepalese economy. It has received a higher priority in most of the developmental plans. Despite all the efforts in this sector, the problem of poverty has posed itself as a big challenge to Nepal.

Rice, maize, wheat and millet are the major food crops and the productivity of these crops at present are either stagnant or in slow growth rate. In response to increasing land scarcity, galloping population and present scenario of the agricultural production in the country, potato crop has high production potentiality to give more food per unit area and per unit time. In addition, increased potato production in the country can minimize the pressure on food grain crops and only then, significant achievements can be obtained in food security. However, the tremendous importance of potato crop as a source of income for poor farmers and of food for the rural and urban poor is often overlooked improving food security and alleviating poverty in the country.

INTRODUCTION

Agriculture in Nepal

In topography, majority of the country is composed of hills and mountains accounting for 77 percentage of the total land area with the remaining 23 percentage flat, fertile lands of the terai. Altitude ranges from 75 m to 8848 m asl. experiencing tropical, miso thermal, micro thermal, taiga and tundra climate. Due to the topographical constraints, only 20.1 percentage of total land area is brought under cultivation. The net area under cultivation is 2.97 million hectares. Most of the farms are small with many fragmented plots covering wide range of environmental conditions.

Agriculture is the mainstay of the national economy accounting for 42 percentage of the GDP and 82 percentage of the employment (APSD, 2000). Nepalese agriculture at present is facing three major challenges; ensure food security, reduce poverty level and sustainable natural resource management. In a developing country like Nepal, hunger is the consequence of poverty and access to the food by individuals is usually conditioned by income. Thus, poverty alleviation is directly related with the food security to the population. But farming is primarily subsistence-oriented and largely based on systems which use no or minimal external inputs (Schultz, 1997).

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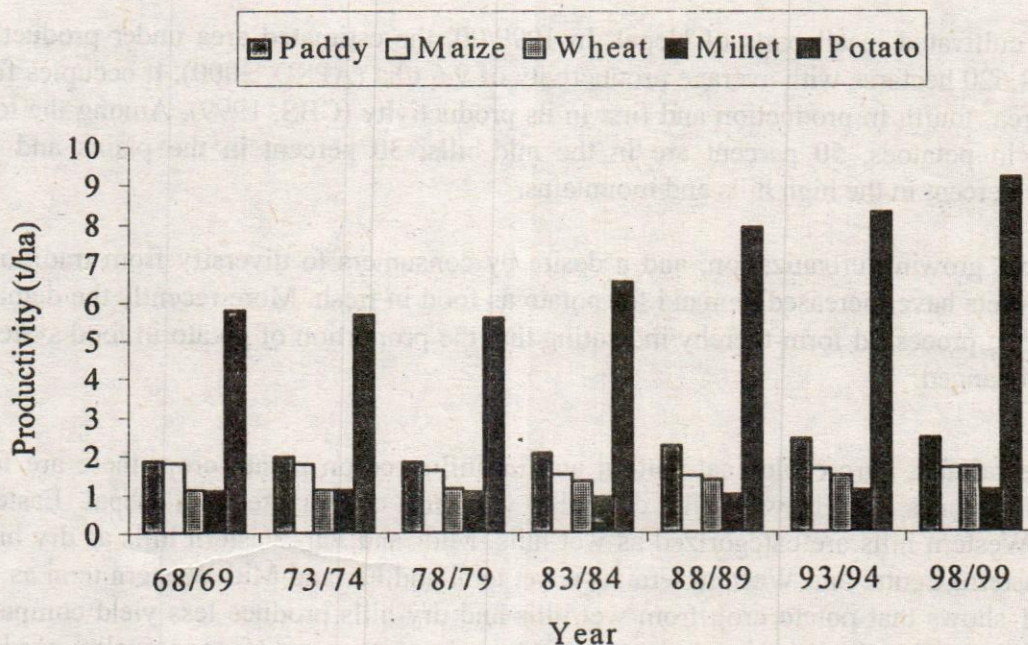
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Among several crops cultivated in the country, rice is the most important cereal crop and occupies 50 percent of the total cultivated area and contributes nearly 20 percent to the agricultural gross domestic product providing more than 50 percent of the total calorie requirement to the Nepalese people (RRP, 2000). Wheat is the second major food crop of Nepal and occupies about one fourth of the total cultivable land and holds the third position in food grain production. Although these cereal crops are the basis of energy supply in daily diets of the people, potato is also regarded as staple food for the population at high altitudes and a major vegetable in other places (Lama et al., 1996).

Nepalese farmers are found concentrated on growing rice, maize, wheat and potatoes as major food crops. All of these crops draw nutrients from the soils heavily. The average use of chemical fertilizer is much lower than the recommended doses for the particular crops (APROSC/JMA, 1995). Due to increase in cropping intensity and adoption of improved varieties, the net removal of plant nutrients from the soil has far exceeded the rate of replenishment (Pradhan et al., 1992) thereby deteriorating soil fertility and inviting fertility related problems in the soil.

The national agricultural objectives are guided by Agriculture Perspective Plan and potato has been considered as one of the high value agricultural commodities of the country (APP, 1995). In most of the developmental plans of Nepal, agriculture has received a high priority (LARC, 1997), however, despite a high priority and investment in agriculture, productivity of most of the crops have been observed to be almost stagnant or even declining (Figure 1).

Figure 1. Productivity trend of different food crops during last three decades



POTATO CROP AND POVERTY ALLEVIATION

Potato in Nepalese agriculture

Potato is the most important non-cereal food crop of the world. It provides more dry matter and calories per unit land and time than any other major food crop. It is one of the rare non-cereal foods that can meet the nutritional requirement of the fast-growing world population, particularly in the developing countries like Nepal. Although potato is the major crop of temperate region it is grown all over the world and potato production worldwide stands at 295 million tons and covers more than 18 million hectares (CIP, 1998).

Potato is believed to be cultivated in Nepal shortly after cultivated in Europe (Khatri, 2000). Under a joint programme of Nepal and Indian government, this crop got the official attention in 1962 and at present it has become an increasingly important commodity for the growing population of the country. National Potato Development Programme (NPDP) was started in 1972 with a national mandate of quality seed production of improved varieties and coordination of research for the development of appropriate technology (PRP, 2001)

As the change has to be a part of any institutions to keep its pace according to the national needs, NPDP was separated into Potato Research Programme (PRP) and Potato Development Programme (PDP) in 1991. They are with the specific mandate on research and development through the existing network of Nepal Agricultural Research Council and Department of Agriculture, respectively.

Potato crop at present

Potatoes are cultivated in all parts of Nepal. In 1999/00, the estimated area under production exceeded 122,620 hectares with average productivity of 9.6 t/ha (APSD, 2000). It occupies fifth position in area, fourth in production and first in its productivity (CBS, 1999). Among the total area planted in potatoes, 50 percent are in the mid-hills, 30 percent in the plains and the remaining 20 percent in the high hills and mountains.

Rising income, growing urbanization, and a desire by consumers to diversify from traditional cereal-based diets have increased demand for potato as food in fresh. More recently the demand has increased in processed form thereby indicating that the proportion of potato in food systems in Nepal has changed.

Based on the rainfall, agro-ecological pattern and its influence on potato crop, there are four potato growing zones namely wet hills, dry hills, wet terai and dry terai in Nepal. Eastern, Central and Western hills are categorized as wet hills. Mid- and Far-Western hills as dry hills. Similarly, Eastern, Centre and Western terai as a wet terai and Far and Mid-Western terai as dry terai. Table 1 shows that potato crop from wet hills and dry hills produce less yield compared with national average, which is due to several factors; however, use of poor quality seed by majority of the farmers is the important one. However, the increased use of chemical fertilizers, improved cultivars and plant protection measures have helped improve productivity to some extent in national level.

Table 1: Belt wise area, production and yield of potato crop during 1999/2000

Ecological Belts	Area (ha)	Production (mt)	Productivity (mt/ha)	Remarks
1. Wet hills	33462	624687	9.39	(-)
2. Wet terai	34453	368897	10.70	(+)
3. Dry hills	14135	109321	7.73	(-)
4. Dry terai	7570	79595	10.51	(+)
Total	122620	1182500	National Avg. 9.64 t/ha (ASD, 2000)	

Source: APSD, 2000

But if compared with world data reported by CIP (1998), productivity of this crop is among the lowest and an urgent step has to be initiated on research and development activities. Just by raising the average yields of wet and dry hills alone to the national average it will contribute significantly on food security and poverty reduction in the hills of Nepal.

Major achievements on potato crop in Nepal

If percentage increase in area and production among major food crops (rice, maize and wheat) is compared, with potato crop from 1964/65 and 1999/00, the area and production of potato has increased substantially over the years (Table 2) followed by wheat which is due to the high return on investment by the adoption of high yielding varieties and improved cultural practices by the farmers (Shakya, 1989).

Table 2: Area, production and % increase comparison of major crops in Nepal

Crop	1964/65		1999/00		% increase	
	Area (000 ha)	Production (000 mt)	Area (000 ha)	Production (000 mt)	Area (000 ha)	Production (mt)
Rice	1377	2709	1550	4030	13	49
Maize	579	819	819	1445	41	76
Wheat	452	534	660	1184	46	122
Potato	66	420	123	1183	86	182

Source: CBS, 1990, APSD, 2000.

The entire breakthrough in potato production is a result of joint approach of research and development. The major achievements are briefly presented below:

- New potato varieties gave higher yield,
- New potato varieties are resistant to late blight disease,
- Development of seed plot technique and making seed producer group capable on producing healthy seed material themselves,
- Development of package of practices suitable for different agro-climatic regions,
- Upto 250,000 virus-free healthy tuberlets are produced annually at Khumaltar and distributed to farmers' groups, ADOs and others for further multiplication through Potato Development Section Khumaltar,

- Several exotic and local germplasms have been collected and evaluated mainly for late blight disease resistance and higher yield. As a result, varieties such as Kufri Sindhuri, Kufri Jyoti, Desiree, Janak Dev, Khumal Seto and Khumal Rato have been officially released and several others are identified and recommended for different agro-ecological zones (Khatri and Shrestha, 1999),
- Open pollinated (OP) progenies were found inferior to hybrid in any stage of their generations,
- True potato seed progenies, HPS 7/13, HPS 2/67 in the plains and HPS 7/67 and HPS I/13 were recommended for cultivation in the hills of Nepal (PRP, 1997). However, HPS II/67 and HPS I/13 TPS families have been accepted by the farmers widely (Lama, 1999).
- Results show that TPS can be an alternative solution to resource poor farmers and equally good as that of recommended varieties,
- The demand for TPS has increased significantly these years indicating farmer's adoption,
- From series of studies on clonal tubers on manuring, chemical fertilizer dose @ 100:100:60 kg NPK and compost @ 20 t/ha is recommended for potato cultivation. Further verification on different doses in different agro-ecological zonation is under way,
- Cropping system studies conducted at Khumaltar showed that by growing legumes during winter and spring season gave good grain yields including the significant influence on succeeding rice and potato crop in the same plots,
- Potatoes planted at the spacing of 60x25 cm using 24 g sized tuber gave maximum yield,
- Two tons/hectare seed rate was found economically more profitable and 5% reduction in seed rate resulted in only 15 percent reduction in yield concluding that the higher multiplication rate with the low seed rate is advantageous and insured against maximum profit with high seed rate,
- Pest and disease management studies mainly focused on bacterial wilt (*R. solanacearum*), black scurf (*R. solanii*), wart (*S. endobioticum*) and late blight (*P. infestans*),
- The most effective treatment against common scab was seed treatment with 3 percent boric acid before storage,
- Integrated Disease Management through Farmers Field School has been found as a new approach effective in managing late blight and bacterial wilt diseases (PRP, 1998),
- Plant materials of *Eucalyptus* species, *Chenopodium botrys* and *Artemisia vulgaris* have been found to be as effective as the insecticides in managing potato tuber moth (Pradhan and Shrestha, 1991),
- As the climatic condition in the hills favour the use of low-cost storage systems, farm house, pit storage and rustic store have been identified as best storage systems for the hills and for the plain, there is no option for the cold storage,

POVERTY SITUATION IN THE COUNTRY

Nepal is worst affected by human poverty among other nations in Asia. For the first time a study on income distribution, employment and consumption pattern in Nepal carried out by National Planning Commission in 1976 had estimated 36 percent of the total population below the

poverty line. In 1984, a survey conducted by Nepal Rastriya Banijya Bank revealed 41.5 percent of the population living below the poverty line. The Living Standard Survey launched by Central Bureau of Statistics Nepal in 1996 estimated 42 percent of the population living below the absolute poverty line.

At the time of the commencement of the Eighth Plan, 49 percent of the people were estimated living below the absolute poverty line (HMG, 1998). From these figures it is clear that the poverty is increasing rapidly and from poverty alleviation angle, the picture is far from encouraging. Therefore, all developmental activities of His Majesty's Government of Nepal these days are concentrated towards reducing poverty from an estimated level of 42 percent to 32 percent at the end of Ninth Five- Year Plan i. e. 2002 and to 10 percent in next 20 years i.e. by the year 2017/18. Based on the living standard measurement, incidence of poverty by region in Nepal is summarised as below:

Table 3: Estimate of population living below the poverty line in Nepal

Particulars	% population below poverty line
A. According to consumption survey category	
Kathmandu	4.2
Other urban areas	36.0
Western hills/Mountains	60.4
Western Terai	48.7
Eastern mid-hill and mountains	35.0
Mid eastern Terai	41.3
B. According to geographic region	
Mountain	56.0
Hill	41.0
Terai	42.0
C. Urban/rural	
Urban	23.0
Rural	44.0
Average in Nepal	
	42.0

Source: *The Ninth Five-Year Plan, 1998.*

According to the consumption survey category mentioned in Table 3, Kathmandu valley is least and Western hills are worst affected by poverty. According to the geographic region survey report, 41 and 42 percent of the population is below the poverty line in the country. If compared rural areas with urban of the country, 23 percent of the people below poverty line live in the urban and 44 percent in the rural areas revealing that poverty concentration in the rural is much more higher than in the urban area. This is found highly concentrated in rural areas of Nepal and most of the urban poor are an extension of rural poverty (APP, 1995).

The population growth rate is one of the highest in the region at 2.4 percent per year (APSD, 2000), meaning that food for an additional 600,000 people must be either produced or imported each year. Since 90 percent of the food consumption in the country takes place where it is

produced, it is clear that most of the increased food requirement in the future will have to come from production in Nepal itself. In developing country like Nepal, poverty is the consequences of lack of food and access to food by individuals is usually conditioned by income (Lama and Rai, 1998). Thus, poverty alleviation is directly related with the food security to the growing population and to ensure food security for the estimated 24 million and for rapidly growing population is the first challenge of agriculture in the country.

The depth of poverty varies belt wise. Food availability and requirements of cereal crops is also different. In Dry terai and Wet terai it is positive, and in Dry hills and Wet hills, it is in negative trend (Table 4).

Table 4: Belt wise food availability and requirement of cereals in Nepal (metric tons), 1998/99

Belts	Population (#)	Rice	Maize	Millet	Wheat	Barley	Total	Requirement	Balance (+ -)
1. Dry terai	2056452	315400	59251	411	136380	100	511542	372217	139325
2. Dry hills	2926266	93383	131621	29998	135361	4614	394972	581222	-186250
3. Wet Terai	8635381	1236002	112617	13133	390427	517	1752696	1563002	189694
4. Wet hills	8820848	429408	616605	195431	193479	3479	1438402	1763050	-324648
Total	22438914	2074193	920094	238973	855647	8710	4097612	4279491	-181879

Source: Marketing Development Directorate, MOA

HOW POTATO HELPS ALLEVIATING POVERTY IN THE COUNTRY

Potato is probably the only crop in Nepal which has increased both its area and yield since many years. It has been brought about by the adoption of high yielding varieties and improved cultural practices (Wells et al., 1996). Potato has potential to substitute staple food (cereals) in remote mountainous regions of Nepal. Increased potato production in the hills not only fulfils the food needs of people in the food deficit hills of Nepal, but also increases adequate supply of seed materials. Based on all these factors, agricultural Perspective Plant (APP) of Nepal has identified potato as the priority crop. Increased productivity and area under potato may create local employment for men and women and market for agribusiness promotion. The contribution of potato crop in poverty alleviation through various sectors is summarized below:

Contribution in the diet

- Potato gives comparatively higher food production
- It gives option to the consumers to diversify their food intake from strictly cereal-based diets to greater consumption of potatoes
- Potato is one of the world's major staple food crops and produces more dry matter per hectare than the major cereal crops
- Potato has gained popularity throughout the country owing to its nutritious food value for consumers and more importantly perhaps, as the cash crop for many farmers.
- Potato is an important source of dietary fiber.
- Potato provides significant amount of protein, vitamin, carbohydrate and iron.

- Potato is a substantial source of ascorbic acid, thiamin., niacin and pyridoxine and its derivatives.
- Potentially more food value (calorie and protein) can be produced per unit of time, per unit of land and per unit of water with the potato than any other major plant food.

Contribution in economy/employment generation

- Potatoes can also help to alleviate poverty by providing employment opportunities in production, processing and marketing
- More than simply food crops for the rural poor or vegetable for the urban people, potato can also serve as source of cash income for low income farm households,
- Potato gives comparatively high cash return
- Employment creation in the terai and in the hills
- As potato crop has the strong export potential and income from potato is expected to be triple.
- Potato can be the source of raw material for processing products for rural and urban consumption

Contribution in soil and environment

- Potato is an important soil conditioner.
- Potato is a versatile commodity adapted to a wide range of environments.
- Potato gives good yields even under conditions in which other crops may fail.
- Climatic diversity allows growing this crop throughout the country varying the cropping patterns and cultivation periods with altitudes.

Contribution in food security

- Potato serves as the food security crop alleviating seasonal shortages and fill food gaps caused by natural or manmade disaster
- High yield potential, so, it has been prioritized as an important food crop by His Majesty's Government of Nepal in order to fight increasing hunger and malnutrition.

CONCLUSIONS

Despite several initiatives to reduce poverty, no perceptible improvements in poverty situation have been visualized. The Ninth Five-Year Plan also emphasized poverty reducing policies and programme. In the plans and policies, there are several reasons realized about existing poverty situation in the country, however, government policy towards food security and effective implementation of Agricultural Perspective Plan (APP) is one of the some highly positive developmental activities towards reducing poverty in the country.

Since food security is an important goal of agriculture research in Nepal at present and potato gives more food per unit area and per unit time, existing production constraints must be realized, given focus and resolved. Realizing the importance of this crop, APP has given priority to this crop to fulfil the food needs and in alleviating poverty. As a result, there are some positive trends towards it. However, sustained growth in agricultural sector is critical for feeding the rapidly growing population, which in turn is affected by several factors.

To feed fast rising population of the country, Nepalese farmers will have to double their output in agriculture.

Although, potato crop in Nepal faces many problems, it allows farmers to harvest upto 80 percent or more of the dry matter production as edible nutrition food. In the future, only potatoes may play an important role in national food production systems if technology is generated and transferred as needed.

CONCLUSIONS

The research indicates to reduce poverty, no possible without attention in poverty studies have been initiated. The Ninth Five-Year Plan also emphasized poverty reducing policies and programme is designed and policy has been developed. However, government policy towards food security and effective attention in the country however, Agricultural Research Plan (ARP) is one of the country's first developmental activities towards reducing poverty in the country.

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