

INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE & MANAGEMENT

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A STUDY ON THE CONTRIBUTORS TO GROWTH OF POTATO AND GINGER IN HIMACHAL PRADESH

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ABSTRACT

Agriculture continues to be the largest source of employment and livelihood for population in Himachal Pradesh. It contributes to 17 percent of total GDP and employs almost 69 percent of population in Himachal Pradesh. In this manuscript, out of numerous contributors to growth, six principals are identified, and their contribution to growth is analysed. In the past growth of agriculture was driven by the change in agricultural pattern, directly affecting agricultural output and farm income. Things are entirely different today, identifying the factors affecting the growth of ginger and potato can help in clearing the ambiguities regarding growth variables and factors having no impact. The contributions will serve the academic as well as the corporate community. With the tremendous increase in the cost of living over the last few decades, it got difficult to make ends meet with the cultivation of traditional crops; this is the main driving force which made commercial crops overtake traditional farming. Potato and Ginger despite being traditional crops are able to make it to the list of commercial crops in the study area. Farmers in the study area, i.e., Sirmour, Solan and Shimla are primarily small scale cash crop growers and Potato, and Ginger are two of the main cash crops. The study was undertaken to prioritise factors contributing to the growth of cash crops viz. Potato and Ginger in the selected districts. To achieve the objective of the study, a scale has been developed comprising of twenty-eight variables. The statements recorded are measured on a 5 – point Likert scale, i.e. (1) Strongly disagree, (2) disagree, (3) neutral, (4) agree and (5) strongly agree. By responses of farmers, factor analysis has been done to extract the factors from observed variables which contribute to the growth of potato and ginger in the study area.

KEYWORDS

cash crops, growth, potato, ginger, factor analysis.

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INTRODUCTION

The economy of Himachal Pradesh is agrarian. Despite economic development and industrialisation, agriculture is the life and soul of the state. It is the source of essential crops, including those which feed the human population, produce raw materials for industries and that which feed livestock. Agriculture is the most crucial sector for ensuring sustainable development, nutritional security and for the alleviation of poverty not only in Himachal Pradesh or India but in the whole world. From an agricultural point of view, Himachal Pradesh is a unique state. It has fertile soils, wild climatic variations which are well suited to a wide variety of crops. Agricultural development in the mountain region is circumscribed by mountain specificities namely; accessibility, marginality, fragility, niche, human adaptation, mechanisation etc., created by unique dimensions that distinguish them distinctively from plains.

Farmers in Himachal are primarily small landholders. With the tremendous increase in the cost of living in the last few decades, it got difficult to make ends meet with the cultivation of traditional crops. Agricultural diversification requires a high investment of capital and labour inputs. There is a need for the development of not only appropriate farm production technology but also processing and marketing technology; this is the main driving force which made commercial crops overtake traditional farming. Historically, changes in agricultural patterns have been the main force driving growth in agricultural output and farm income in countries that have modernised their economies (Rozelle et al. 2003). Factors that can account for improvements include changes in technology, institutional reforms, infrastructure development, improvements to human capital and others. A partial productivity measure such as yield may increase over time because of some fundamental change in the production process, or because of increased use of inputs such as labour, fertiliser or water. Trends over time for total factors of production can help clear up the ambiguities about sources of growth (Pingali & Heisey 2001).

REVIEW OF LITERATURE

As the commercial importance of horticultural crops is increasing day by day, mainly vegetables are now getting due importance in the national and international agenda. Economic factors drive diversification in favour of fruits and vegetables. The diversification of agriculture from inferior cereal towards high-value crops compatible with the comparative advantage of the region is suggested as a possible solution to stabilise and raise farm income and increase employment opportunities (Vyas, 1996). Another study showed the importance of infrastructure in explaining the extent of diversification. They observed that access to road, market and irrigation determines the scope, success and profitability of diversification through high paying crops (Ashok and Balsubramania, 2006). Some other studies opine that with the progressive shrinking of land holding size it is not possible for farmers to depend on a single crop. Small and marginal holders have, of course, certain advantages from the viewpoint of availability and cheapness of family labour which can be effectively managed in diversifying crops (Joshi et al., 2007 and Pingali et al., 1997). In Himachal, there are four major objectives of agricultural diversification. First is to increase the income of the small households, second to attain fuller employment in the farm household, third to stabilise the farm income over the seasons, and fourth conservation and enhancement of natural resources.

Realising the importance of cash crops, many farmers are diverting their resources to the production of potato and ginger. Not only do these crops can be mixed crops providing farmers with a sense of security as compared to other cash crops which cost high on pocket pre and post-harvest when compared to these crops but as high risks are also involved on farmer part when investing his resources (Pandaraiah and Sashidar, 2015). Production of these crops has vital importance, as these can help strengthen the economy as a whole and farmers who depend on their production for earning their livelihood, alike (Singh et al., 2015). Potato and ginger are in demand round all the year for table use as well as their processed items. Their usage is not only restricted for regular consumption but as alternative medicine for the health benefits they provide as antioxidants (Mehnaz Nikkhhah Bodagh et al., 2019) in the paper tried to summarise the evidence on effects of ginger consumption on gastrointestinal disorders based on clinical trials, (Rashid et al., 2017) study emphasizes on use of natural antioxidants and their mode of action. Natural antioxidants have been preferred worldwide for the past 15- 20 years, because of the trend to avoid or minimise the use of synthetic food additives. Recently, potato peels have found an alternative usage as potato peel contains some antioxidant compounds, not just this also ginger has the most potent antioxidant level among all herbs also it is suggested that the presence of 12 different Phytochemicals make the ginger one of the most potent food sources of antioxidant as stated in the paper.

The previous discussion dealt with the review of existing studies and related topics and was confined to explore the existing research gap which provides valuable information to frame the need, scope and objectives of the present study. After going through available literature on cash crops in Himachal Pradesh and India, it has been observed that substantial work has been done on agriculture, but such work has been confined to apple, seed fruits, food grains and cereals, garlic, flowers, and off-seasonal vegetables therefore, current study has been undertaken on the growth and development of potato and ginger.

NEED OF STUDY

In modern times, it is challenging for farmers to make an adequate profit by the cultivation of traditional food crops. Cost of cultivation is on the rapid hike due to depletion of soil, marginal farmland, diseases, change in climate and due to change in the pattern of demand. Farmers have to focus more on cash generation and more revenue creation. Diversification is an integral part of the structural transformation of an economy. The agriculture diversification is not possible without appropriate infrastructural and institutional reforms. Agricultural diversification needs proper credit facilities for purchasing of inputs, high yielding varieties of seeds and fertilisers, insecticides, availability of irrigation facilities for lesser dependence on rainfall. Given the importance of agriculture in the context of the state economy and a large number of changes brought about in agricultural setup, it is necessary to study the growth and trends in the area, production and productivity under crops in Himachal Pradesh. Topography and nature in Himachal Pradesh suit cash crops like Potato and Ginger, and due to fewer requirements of funds, it is easier to grow these crops. As evident from review of literature, there are many issues and problems like limited land, scarcity of resources, shortage of irrigation facilities and lack of awareness; which are inevitably attached to the cultivation of cash crops. IARI and CPRI among others are putting in a lot of efforts, but there is still potential that is needed to be harnessed. The proposed study has been undertaken to study the main factors which contribute to the development and growth of cash crops namely Potato and Ginger in Himachal Pradesh.

OBJECTIVE

To highlight and prioritise factors on the basis of their contribution to the growth of potato and ginger in Himachal Pradesh.

RESEARCH METHODOLOGY AND DATA COLLECTION

For evaluating the objective of the study, primary data was collected through personal interview method with the help of a well-structured and pre-tested schedule for the year 2016-17. A field survey was undertaken to work out the demographic profile of farmers, socio-economics, factors contributing to production and the constraints in production of these crops in the state of Himachal Pradesh.

In order to get the desired information from the respondents, a sample of respondents has been selected; Multistage sampling has been used to conduct the research study:

- **At first stage:** Out of 12 districts of the state of Himachal Pradesh, three districts namely Shimla, Sirmour and Solan have been purposively selected for the study. Two factors influenced the selection of the districts. First, in these districts, the cultivation of high-value crops namely potato and ginger is being practiced since the late sixties and early seventies.

Second, these districts are selected by highest production of potato and ginger, i.e. both potato and ginger are produced in these districts, and the productivity is highest when put to comparison with other districts of Himachal Pradesh.

- **At Second Stage:** 2 administrative blocks from each of district have been selected based on the highest number of ginger and potato growers.
- **At Third Stage:** 3 village Panchayats from each selected block have been selected by maximum average and a minimum average of these cash crops.
- **At Fourth Stage:** 20 potato and ginger producers have been selected from each village Panchayat keeping in view different demographic features.

TABLE 1: SAMPLE SIZE

| Sr. No. | Districts | Blocks | Respondents |
|---------|-----------|-----------|-------------|
| 1 | Sirmour | Rajgarh | 60 |
| | | Shillai | 60 |
| 2 | Solan | Solan | 60 |
| | | Kandaghat | 60 |
| 3 | Shimla | Mashobra | 60 |
| | | Narkanda | 60 |
| Total | 3 | 6 | 360 |

RESULTS AND DISCUSSION**GROWTH OF POTATO AND GINGER AS CASH CROPS: A FACTOR ANALYSIS**

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy has been used to examine the appropriateness of factor analysis. Higher values between 0.5 and 1 indicate that factor analysis is appropriate. The results of the Kaiser-Meyer-Olkin (KMO=.882) measure of sampling adequacy and Bartlett's test of sphericity with highly significant value indicates the appropriateness of the use of factor analysis.

TABLE 2: KMO and Bartlett's Test

| | | |
|---|--------------------|-----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | .882 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 10890.911 |
| | df | 378 |
| | Sig. | .000*** |

**Significant at .05 level of confidence

TOTAL VARIANCE EXPLAINED

Table 3 shows how many variables can be clubbed together to make a single factor. Eigen value represents the amount of variance associated with the factor. Therefore, only factors with eigen value more than one are retained. Six factors have been derived from twenty-eight variables which show 77.875 per cent variance.

TABLE 3: TOTAL VARIANCE EXPLAINED

| Component | Initial Eigen values | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|-----------|----------------------|---------------|--------------|-------------------------------------|---------------|--------------|-----------------------------------|---------------|--------------|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 8.065 | 28.805 | 28.805 | 8.065 | 28.805 | 28.805 | 5.906 | 21.095 | 21.095 |
| 2 | 5.152 | 18.399 | 47.204 | 5.152 | 18.399 | 47.204 | 3.928 | 14.030 | 35.125 |
| 3 | 3.089 | 11.032 | 58.236 | 3.089 | 11.032 | 58.236 | 3.875 | 13.838 | 48.963 |
| 4 | 2.366 | 8.450 | 66.686 | 2.366 | 8.450 | 66.686 | 3.405 | 12.162 | 61.125 |
| 5 | 1.874 | 6.692 | 73.378 | 1.874 | 6.692 | 73.378 | 2.650 | 9.464 | 70.589 |
| 6 | 1.259 | 4.496 | 77.875 | 1.259 | 4.496 | 77.875 | 2.040 | 7.286 | 77.875 |
| 7 | .896 | 3.200 | 81.074 | | | | | | |
| 8 | .774 | 2.764 | 83.838 | | | | | | |
| 9 | .596 | 2.130 | 85.969 | | | | | | |
| 10 | .508 | 1.814 | 87.783 | | | | | | |
| 11 | .470 | 1.678 | 89.460 | | | | | | |
| 12 | .391 | 1.398 | 90.858 | | | | | | |
| 13 | .355 | 1.269 | 92.127 | | | | | | |
| 14 | .292 | 1.042 | 93.169 | | | | | | |
| 15 | .271 | .968 | 94.137 | | | | | | |
| 16 | .246 | .880 | 95.017 | | | | | | |
| 17 | .235 | .841 | 95.858 | | | | | | |
| 18 | .222 | .795 | 96.652 | | | | | | |
| 19 | .218 | .778 | 97.430 | | | | | | |
| 20 | .182 | .650 | 98.080 | | | | | | |
| 21 | .152 | .543 | 98.623 | | | | | | |
| 22 | .129 | .460 | 99.084 | | | | | | |
| 23 | .087 | .311 | 99.395 | | | | | | |
| 24 | .061 | .217 | 99.612 | | | | | | |
| 25 | .035 | .126 | 99.738 | | | | | | |
| 26 | .033 | .117 | 99.855 | | | | | | |
| 27 | .023 | .083 | 99.938 | | | | | | |
| 28 | .017 | .062 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis

Source: Data collected through questionnaire

ROTATED COMPONENT MATRIX

To refine the study and improve the interpretability, the variables are rotated by using varimax rotation to find the underlying constructs and their relationship. The variables are chosen to represent the various components facilitating the growth of Potato and Ginger. The result of the rotated component from table 4 identifies six essential underlying elements which are most correlated.

TABLE 4: ROTATED COMPONENT MATRIX*

| Statements | Component | | | | | |
|---|-----------|-------|-------|-------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Researchcenters_location_mainreason_forchoiceofcrops | .977 | .080 | .008 | .108 | -.041 | -.009 |
| Infrastructural_facilities_available | .975 | .096 | -.005 | .119 | -.029 | -.018 |
| Various_informativecampaigns_timetotime | .974 | .084 | .000 | .139 | -.025 | -.014 |
| Govtprovides_helpat_subsidised_rates | .973 | .100 | .020 | .119 | -.009 | -.005 |
| Abundance_ofsubsidies_incentivesfor_thesecrops | .960 | .081 | -.033 | .118 | -.038 | -.032 |
| Agriexperts_govtempoyees_alwyscoperate | .958 | .137 | .016 | .113 | .003 | .008 |
| Always_beenintrstd_agriculture | .105 | .828 | .230 | .148 | -.126 | .158 |
| Proud_Tobe_part_ofagricommunity | .112 | .828 | .295 | .150 | -.082 | .136 |
| Agri_ancestral_occupation | .110 | .815 | .255 | .107 | -.206 | -.032 |
| Growing_gingerpotatoes_linkedto_traditionalfarming | .116 | .795 | .047 | -.001 | -.138 | .201 |
| Highsocial_respet_dueto_work | .112 | .731 | .152 | .146 | -.036 | .038 |
| SelectionCrops_cumbersome_bnkingprocedure | -.024 | .052 | .895 | .070 | -.091 | .011 |
| Limitedresources_createnoproblem_producingthesecrops | -.008 | .105 | .887 | .099 | .003 | .034 |
| Can_be_cultivated_asmixedcrop | .086 | .293 | .840 | .069 | -.024 | .145 |
| Cost_ofproduction_is_less | .069 | .331 | .824 | .116 | -.025 | .231 |
| Hiredlabour_isnot_alwaysrquird | -.102 | .223 | .747 | .068 | -.068 | -.109 |
| Soilrich_organicmatter_aptfor_gingerandpotato | .150 | .133 | .096 | .893 | .065 | .093 |
| Climatic_conditions | .112 | .109 | .106 | .890 | .004 | .137 |
| Fancystorage_notrequired | .178 | .115 | .109 | .880 | -.033 | .097 |
| Crops_comparatively_more_tolerantto_droughts_diseases | .204 | .149 | .079 | .831 | .009 | .212 |
| Cashcrops_provideprospect_higherincome | -.116 | -.064 | .019 | -.020 | .879 | -.043 |
| Creationof_employment | -.043 | -.101 | -.108 | -.037 | .848 | .050 |
| Recieve_fairshare_profits | -.138 | -.263 | .008 | -.004 | .805 | .035 |
| Thesecrops_makepossible_highstdofliving | .146 | -.035 | -.074 | .084 | .602 | .029 |
| Staplefood | .008 | .003 | -.015 | -.006 | -.046 | .727 |
| Highdemand_fortable_processeditems | -.126 | .302 | .121 | .215 | -.060 | .681 |
| Easetoaccess_market_for_theseproduce | -.020 | .045 | .012 | .250 | .174 | .680 |
| Thesecrops_arealways_demanded | .049 | .412 | .207 | .182 | .047 | .568 |
| Extraction Method: Principal Component Analysis. | | | | | | |
| Rotation Method: Varimax with Kaiser Normalization. | | | | | | |
| a. Rotation converged in 6 iterations. | | | | | | |

The variables are chosen to represent the various factors leading to the growth of commercial crops namely potato and ginger in Himachal Pradesh. The result of rotated component matrix drawn under table 4, identifies six important underlying factors which are most correlated. The first factor, i.e., **help and subsidies by the government** include load on research centers location as a main reason for the choice of crops, infrastructural facilities available, various informative campaigns from time to time, the government provides help at subsidised rates, an abundance of subsidies and incentives for these crops, agricultural experts and government employees always cooperate. It implies that the location of agricultural research centers and provision of **subsidised seeds and other agricultural counselling and help** are the main reasons that result in the selection of these crops.

The second important factor, i.e., **ancestral occupation** represents five variables namely interest in agriculture, proud to be part of the agricultural community, agriculture being traditional occupation, growing ginger and potatoes linked to conventional farming and high social respect due to agriculture as work.

The third factor, i.e., **cost**, finds its identification with variables like the ease in banking procedures, lesser monetary requirements, less production cost, can be cultivated as mixed crop and lower need for hired labour. It is further revealed by the study that the selection of cultivation of any cash crop is very much affected by the requirements of cash and cost of farming i.e., lesser the cost more are the chances of the crop's cultivation.

The fourth category, **favourable climate conditions** is identified with weight on four factors which include organic matter-rich soil suitable for ginger and potato cultivation, suitable weather and climatic conditions, no requirement of fancy storage due to cold weather, cold weather facilitating crop tolerance to diseases and drought. It can be concluded that **cold weather** in hilly and mountain areas along with **fertile soil** provide suitable conditions for the production of ginger and potato.

The fifth factor, i.e., **income generation** includes the prospect of higher income, the creation of employment, a fair share of profits and possibility for a higher standard of living. It can be concluded that the scope for higher income generation from ginger and potato results in their selection for cultivation, particularly in areas under study and hilly area in general.

The sixth factor and the last factor, **Demand and residual management** includes staple food, high in demand for a table and processed items, ease to access market and demand throughout the year. It is further revealed by the study that potato and ginger are selected among various options for cultivation, because of their year-long demand and due to its quality of being staple crop, i.e. if the crop doesn't get any market it can be traditionally stored for self-consumption by farmers.

CONCLUSION

The result of the rotated component matrix identifies six critical factors which are most correlated viz., help and subsidies by the government, ancestral occupation, cost, favourable climate conditions, income generation, demand, and residual management. The study revealed that the selection of any cash crop for cultivation is affected by the requirements of cash and cost of cultivation, i.e., lesser the cost more are the chances of the crop's cultivation and cultivation of any crop adds to its growth. Also, cold weather in hilly and mountain areas along with fertile soil provide suitable conditions for the production and storage of ginger and potato. These crops also give prospects on higher income and creation of employment which in turn leads to an improved standard of living. Both these crops are a staple food which is high in demand for the table and processed items, readily marketable and are in demand throughout the year. Even if the crop doesn't get any market, it can be traditionally stored for self-consumption as food or seed by the farmers thus reducing risk.

LIMITATIONS OF THE STUDY

- The present study is based on data collected through questionnaire from farmers. Therefore, it suffers from all limitations inherited as it is the case of any study on the perception and viewpoint of the respondents and the possibility of personal bias cannot be ruled out.
- The sample size of the present study is small. It can be attributed to time, and resource constraints and the reluctance on the part of farmers to fill in the questionnaire perhaps because of lack of information and when talking about government policies and experts fear of repercussion.
- Generalisation of the findings may be restricted because of the composition, size of the sample and time period for which data is collected.

SCOPE FOR FURTHER RESEARCH

- Efforts can be made to study the cultivation of commercial crops in context to poverty alleviation.
- There is vast scope to study the process of consultation between policymakers and agriculturists with more systematic and ideological based arguments.

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