Research Article

# Quantitative analysis of returns from vegetable seed crop and fresh vegetables, a case of district gilgit (Gilgit-Baltistan)

## Abstract

The objective of this study was to estimate and compare the costs and revenues of selected vegetables grown for fresh consumption to that of seed crops in district Gilgit. The analysis is based on survey data for 2011-12 harvesting year. Mean comparing t-statistics with dummy variable approach is used as data concordance with each other; indicate that except for net revenue of onion the costs and net revenue of selected vegetables for consumption and seed are statistically different. The analysis conclude that vegetable fresh crops give higher net revenues than vegetable seed in project area due to the high cost of production and low price of output of seed crops. The study reveals, however, that vegetable seed crops have the potential to become attractive enterprise if proper attention is given to develop production and marketing infrastructure.

**Keywords:** labour intensive culture, vegetable seed, consumption, gilgi, harvesting, revenues, infrastructure

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## Introduction

Development of vegetable sub sector is of great importance in densely populated developing countries with high unemployment due to its labour intensive culture; high value added ability both as commodity and as a processed final product and high nutritional value. Quality seed is a prerequisite for development of vegetable sector but unfortunately the annual vegetable seed production in Pakistan is about 84 tons that is negligible quantity for the requirement of the country Akhonzada.[1] Most of the vegetable seed requirements are met through imports from Europe, USA, Japan and India. Thus vegetable seed production is not only important for development of vegetable sector but also will earn/save scarce foreign exchange. The UNDP, The British High commission, AKRSP, and other donor agencies are pushing for introducing vegetable and vegetable seed production to replace poppy and as a strategy of poverty alleviation in Northern Pakistan. The empirical literature documents the importance of relative profitability of vegetable and vegetable seed production and factors affecting them. For instance, Defoer et al.[2] and Malik A[3] for Pakistan, Thakur et al.[4] and Kutty et al.,[5] for India, and Groin et al.,[6] for sub-Saharan Africa show comparatively higher net returns from vegetable and vegetable seed production than other crops. Studies such as Santini[7] for Itlay, Abak et al.,[8] for Turkey et al.,[9] for Canada USA depict that lack of modern techniques, inefficient production and marketing infrastructure are seriously affecting the costs and net returns of vegetable and vegetable seed production. In this paper, we use quantitative analysis to:

i. Estimate and compare the costs and net revenue of selected vegetable grown for consumption and seed crops;

ii. Identify the factors effecting the production and marketing of vegetable and vegetable seed

iii. Forward policy recommendations for the improvement of vegetable seed production.

## Material and Methods

The study is carried out in district Gilgit, Gilgit-Baltistan due to its ideal climatic conditions for vegetable seed production and its recent introduction by AKRSP through North south seed corporation as a strategy for poverty alleviation. Primary data was collected for selected vegetables i.e. onion, tomato and peas for the harvesting season 2004-2005 from 90 growers, 45 each for consumption and seed crops. A pretested questionnaire is used to get the background information of growers, data on economics of vegetables production and problems faced by the growers.

### Data analysis techniques

Budgeting technique is used to arrive at costs net revenues of selected vegetables grown for consumption and seed crops. Then differences between the costs and benefits of the two types of vegetable crops, that is, fresh vegetable crop and the one produced as seed crop, are analyzed by the following techniques.

### Comparing two means: using t-statistics

Partial budgeting uses simple averages to compare the costs and net revenues of two scenarios but these statements cannot decide whether the differences statistically significant or not. For this purpose, we can use the "Test of difference between two means" newbold[10] there are generally two such tests, namely.

**Test of difference between two means of matched pair:** This test hypothesis:

$H0: \mu vc = \mu vs$

$H1: \mu vc \neq \mu vs$

Where:

$\mu vc$ =Average cost (or net revenues) of fresh crops

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$\mu vs$ =Average costs (or net revenues) of seed crops

The t-statistics is:

t-statistics = $d^- sd/n\surd$ (1)

Where is the mean of differences ($di$) between fresh and seed crop for every observation and is the standard deviation of that differences.

The decision rule is:

Reject $H_0$ (in favor of $H_1$) if $tcalculated < -tn-1a2$ or $tn-1a2 > tcalculated$ (2)

**Test of difference between two means of independent samples:** Though the hypothesis remains the same b but test statistics changes for this particular test for independence samples.

t- Statistics = $xvc^{\overline{\quad}} -xvs^{\overline{\quad}} S2venve+\surd S2vsnvs$

Where $xvc^{\overline{\quad}}$ and $xvs^{\overline{\quad}}$ are means of costs (or net revenues) selected vegetables and $S2vc$ and $S2vs$ and $nvs$ and $nvc$ are variances and sample sizes.

**Comparing two means: using dummy variable approach:** Though for comparing two means, the aforementioned t-statistics has relative advantage over partial budgeting, however, it fail to explain the size of the difference of one variable from another. Dummy variable method, a still more sophisticated econometric technique, is use to address this concern (Gujrati, 1995: page 499). For comparison of costs, the model is specified as follows:

C= $\beta\beta 0 + \beta\beta 1 D$ (3)

Where:

C= cost of selected vegetable production (consumption and seed crops)

D= 1 for seed crop and 0, otherwise.

$\beta 0$ and + $\beta 1$ are to be estimated. The estimated $\beta 0$ gives the average costs of vegetable grown for consumption, while $\beta 1$ measures the size by which the costs of vegetable grown for consumption differ from that of seed crops. In the same token, if the revenues of the two scenarios are to be compared, instead of costs (C), revenues (R) would be taken and used as dependent variable in equation 3. For a significant difference, $\beta 1$ needs to be statistically different from zero.

## Results and discussion

We have used the two t-tests given in equation 1 and 2 to see whether there are significant differences of costs and benefits across the fresh vegetable crop and vegetable seed – crop. The results obtained for differences in costs and net revenues are provided in (Table 1), (Table 2), respectively. More specifically, equation 2, the independent- sampled t-test, is used in Table 1, for comparing costs of onion and tomato production due to insignificant correlation (r=0.195 and 0.03) between cost variables respectively; whereas equation 1, the paired -sample t test, is used for comparing cost for peas production due to significant correlation (r=0.62) between its cost variables. Alternatively the coefficient of correlation between the revenue was significant for onion and tomato and non-significant for peas, therefore we have used equation 1, the paired-Sampled t-test, in Table 2 for comparing the revenues of onions and tomato while we have used equation 2, the independent-sampled t-test for peas.

Table 1: depicts that for each of the three crops, the calculated t-ratio are grater then tabulated value, thus we accept alternative hypothesis. $H1{:}\mu vc \neq \mu vs$. This indicates that per acre cost of vegetable production for fresh consumption crop are statistically different from that of seed crops.

**Table 1** Comparison of production costs of vegetable grown for consumption and seed crops

| Crops | t-Statistics used | Calculated value | Tabulated value |
|---|---|---|---|
| Onion | Equation 2 | 2.77 | 2.05 |
| Tomato | Equation 2 | 3.44 | 2.05 |
| Peas | Equation 1 | 4.968 | 2.05 |

**Table 2** Comparison of net revenue of vegetable grown for consumption and seed crops

| Crops | t-Statistics Used | Calculated value | Tabulated value |
|---|---|---|---|
| Onion | Equation 1 | 0.352 | 2.05 |
| Tomato | Equation 1 | 5.36 | 2.05 |
| Peas | Equation 2 | 4.88 | 2.05 |

## Onion

$TC$=53243(6.07)+30671 $D$(2.73) (4)

$NR$=81272(5.34)−8725 $D$(0.493) (5)

## Tomato

$TC$=38158(9.3)+11326 $D$(1.94) (6)

$NR$=63803(3.8)−63131 $D$(−2.66) (7)

## Peas

$TC$=28152(16.3)+7469 $D$(3.1) (8)

$NR$=38642(7.4)−61815 $D$(−8.4) (9)

Table 2: In contrasts, gives the results of t-test for differences in the net revenues of selected vegetable crops. The results show that the net revenue in case of onion, whether grown for fresh and seed crop do not differ significantly, however, the net revenues from fresh and seed crops significantly differ for tomato and peas crops.

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The results of dummy variable approach given in equation 3, further reinforce the t-tests results already discussed; these results, in addition, give the direction and magnitudes of the differences. The fallowing results of dummy variable analysis given in equation (4) to (9) indicate that cost of production of onion seed crop is significantly higher than that of fresh crop. Onion seed crop is produced at Rs.83914 (or 53243+Rs.30671) per acre. The reasons for higher costs of vegetable seed crop production especially of onion are due to its recent introduction to the study area and therefore lake of basic infrastructural facilities and cultural and marketing experience on the part of farmers. Though the costs of onion seed crop production is higher than the fresh crop by about 58 percent, the seed crop does not produce extra net revenue; rather the net revenue from seed crop is less ( by Rs.8725 ) than that of fresh crop ( Rs.81272) per acre.

The cost of tomato and peas seed crops is respectively, higher by 29.68 and 26.56 percent than that of fresh crop (Rs.38158 and Rs.28125) meant by consumption purposes. The revenues, however, of both tomato and peas seed crops are less than the fresh crops; in case of tomato, net revenue are less by 98.95 percent and in case of peas, less by about 160 percent, rather it is negative in the case of peas. Though the costs of seed crop production for tomato and peas are less than the onion, however, the net revenues from these crops are lower than onion due to lower prices of their seed output.

## Conclusion and recommendations

The study was designed to estimate and compare the costs and net revenue of selected vegetables grown as fresh crop and seed crop in District Gilgit. Given current set of sectoral condition, policies and motivation from NGOs production of selected vegetables for fresh crop seems to be profitable enterprise. However, at present, their production for seed crop does not look that much attractive due to high costs of production and low prices of seed output. The study further reveals that vegetables production for seed crop is newly introduced enterprise in the research area, its production and marketing is plagued with major problems particularly lack of marketing infrastructure for proper supply of input and marketing of vegetable output of seed and fresh crops in the study area. Looking at the tremendous potential of Northern Areas of Pakistan in general and Gilgit, in particular, in production of vegetables, vegetable seeds and all sorts of high value crops, the key for policy is to forge efforts of policy makers, scientists, and all the stalk holders to orient vegetable sector and related institutions and established it on modern lines of agribusiness to make it an effective strategy for poverty reduction in Northern areas (Gilgit-Baltistan). Some of the recommendations suggested by the study area as follow.

i. A comprehensive study needed to see production and marketing infrastructure requirements of vegetable sector development, in general and vegetable seeds crops, in particular.

ii. Increase understanding of policy makers and the stalk holders to plan the vegetable sector on modern lines of agribusiness and use it as a strategy for poverty reduction in Northern Areas (Gilgit-Baltistan). The extension department, cooperatives and NGOs can play important role in this direction.

iii. The government can help in this direction by providing the infrastructure and institutional support and encourage the private sector to invest in different sub sectors of the vegetable sector that will not only increase the production and income of farmers but also will contribute to poverty alleviation and sustainable development.[10,11]

## Acknowledgements

## Conflict of interest

The author declares no conflict of interest.

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