

## Economic Analysis of Radish Cultivation in Sultanabad Area in Sindh

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**Abstract:** This study is based on primary data collected from randomly selected 100 growers in Sultanabad area district Hyderabad in Sindh. Two varieties are commonly grown in the study area, i.e. "Japani" and "China". It was investigated that majority of the growers did not follow the recommendations made by the experts particularly for use of chemical fertilizers. The radish yield was estimated which ranges between 290 to 1230 with an average of 750 mds ha<sup>-1</sup>. Moreover, it was investigated that farmers had received higher price in the early season than the mid and late season. It was also found that radish cultivation in Sultanabad area has a great potential because growers had earned better net returns.

**Key words:** Economics, Radish and Sindh

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### Introduction

Radish belongs to the mustard family and was originated from it China and India. It was cultivated since the days of Pharaohs in Egypt and during that period was known as highly prized by ancient Greeks. The fleshy root is eaten either raw with salt as salad or cooked in various ways. It contains vitamin B and C and has a cooling effect and is considered suitable for patients suffering from piles, liver trouble and jaundice. Radish has number of other medicinal values as described by Chaudhry (1979) through analysing its chemical composition and found that from 100 g of edible portion of radish contains 94.4 g moisture, 0.7 g protein, 0.10 g fat, 0.6 g minerals, 0.8 g fibre, 17 mg calories, 9 mg oxalic acid, 22 mg phosphorus, 0.4 mg iron, 33 mg sodium, 138 mg sodium, 5 I.U. vitamin A, 0.06 mg thiamine, 0.02 mg riboflavin, 0.5 mg nicotinic acid and 15 mg vitamin C.

The area and production of radish show that area in Sindh has increased, whereas the production of radish has been declined since 1998-99 to 2001-2002. Data indicates that area of radish has increased from 1,206 to 1,592 hectares and production has been declined from 11,349 to 10,028 metric tones during the same period. In Sindh yield per unit area obtained far below than the other parts of the country but there is possibility to adopt proper cultural practices like, timely planting, proper plant space, use of irrigation and balanced supply of major and minor nutrients. There are number of factors which limit the radish production on farmer's fields, but sowing time has remarkable effect on its production. The sowing of radish start from last week of September to last week of October, but the optimum sowing time reported to be up to 15th October under existing cropping pattern and agro ecological conditions.

Radish requires cool weather, therefore, local varieties are found resistant to heat compared to imported varieties. The temperature 10 to 15 degree centigrade is required for best flavor, texture and size of roots. Whereas, in high temperature the roots become tough and pungent. It can be planted in all type of soils, but fertile loam to sandy loam soils are found suitable for this crop. About 5-6 tractor trolleys of well rotten FYM must be applied before sowing. About 2 to 2.5 kg seed acre<sup>-1</sup> is used for cultivation of one acre land (Khushk *et al.*, 1999). The study was planned to conduct detailed investigation on cost of cultivation of radish in Sultanabad in Hyderabad district with the following objectives.

**Objectives**

- To determine average per hectare cost of production incurred by producers.
- To investigate the physical productivity per unit of radish and to estimate the returns realized by the growers.
- To compute the average per unit return.
- To determine the input output ratio involved in the production of Radish.

**Information source**

The information for this research was derived primarily from in-depth semi-structured interviews with key informants, met during the course of separate survey of radish growers, conducted as part of a broader investigation of the performance of farming system in Sindh. Radish survey in Sultanabad area district Hyderabad was purposely carried out, because of the concentration of radish fields and deemed sufficiently representative study area. An exploratory survey was conducted of radish growers and some members of the vegetable growers association who become "key informants" met on several occasion and with whom relationships based on trust were established. These become the main source of information on what is otherwise a sensitive and difficult to raise subject. The officers from the relevant department i.e. Agri. Extension, Research, Horticulture, Directorate of Agriculture Marketing also provided important information. Given the largely purposive selection of key informants the accuracy and representativeness of the information gained cannot be formally validated. However, all assertions made in this paper were verified by cross checking from at least three or more sources.

**Resource valuation**

Production of farm commodities involves numerous relations between resources and commodities. Some of these relationships are simple while others are complex but according to Heady (1964) they all provide the tools by mean of which problems of production can be analyzed. The production function expressed the way in which output are produced by inputs and the way inputs cooperate with each other in varying proportion to produce any given output of products. A production function can be expressed in farm of:

$$Y = f (x_1, x_2, x_3, x_4.....x_n)$$

Where Y = Output  
X = specific factor of production or resources

The production function has been used to analyze the data collection from the radish producers. The various resources or output as entered into the production process was evaluated at the prevailing market price. The cultural operations were considered the basis to quantify various inputs.

#### **Land inputs**

The land inputs were measured on the basis of area planted under various crops at the selected diversified farm. The main component of land input included the rent of land, irrigation charges and usher tax. Market rate of leasing out one hectare of land for growing various crops as prevalent in the area were considered as an appropriate criteria to compute rent of land inputs for various crops.

$$\text{Liph} = (\text{As} \times \text{Cr}) + (\text{As} \times \text{Ie}) + (\text{As} \times \text{Xut})$$

Where Liph = Land inputs per hectare for specific crop  
As = Area sown under specific crop  
Cr = Contract rate per hectare use of land  
Ie = Irrigation charges rate  
Ut = Usher tax rate

#### **Labour inputs**

Labour inputs include machine use, manual and animal labour. The hiring of tractor along with implements and bullock pair including plough or leveler as prevailing in the area. Therefore, labour inputs as employed to grow various enterprises were estimated on the basis of opportunity cost principle. The following formula was used to calculate the labour inputs.

$$\text{Lis} = (\text{Mh} \times \text{Hc}) + (\text{BwD} \times \text{Hc}) + (\text{MWD} \times \text{Wr})$$

Where Lis = Labour inputs for specific activity  
Mh = Machine hour  
Hc = Hiring charges  
BWD = Bullock work days  
MWD = Man-work days  
Wr = Wage rate

#### **Capital inputs**

The capital inputs used in the various enterprises i.e. seed, farm yard manure, fertilizer, insecticide and pesticide sprays. The actual expenditure as incurred by the respondents on

these capital inputs was investigated from farmers and means were computed for all the farmers. The following formula was used to compute capital inputs for various crops raised on the selected farms.

$$Cph = (Qs \times Pr)(Qm \times Pr) = (Qf \times Pr) + (Qf \times Pr) + (Ppe)$$

Where

- Cph = Capital inputs per hectare
- Qs = Quality of seed used for various enterprises
- Pr = Price per unit weight
- Qm = Quality of manure applied
- Qf = Quality of fertilizer
- Ppe = Actual expenses on plant production
- AS = Area sown under various enterprises

### **Production practices of radish**

The prime objectives of the growers is to get higher yields through adopting the proper management practices and recommended technology. Production of any commodity depends on the combination of different inputs and resources allocation. The main purpose of this section is to describe and analyze the radish production system. The emphasis has been given on qualitative and quantitative analysis of production practices adopted by the radish growers and identification of technical and socioeconomic factors in radish production. The basic data collected in the study is presented here under.

### **Land preparation**

Radish can be planted on all types of soil, but fertile loam to sandy loam is considered as best soils for this crop. Land preparation is considered the initial task for crop cultivation. A good land preparation is necessary for proper and rapid growth of the crop. Land preparation varies from one grower to another. It was found that most of the growers prepare their land with goble, followed by 2-3 cultivators acre<sup>-1</sup>. It was also investigated that 96% of the respondents leveled their land before planking of radish.

### **Seed rate and method of sowing**

Five to six kg is needed for planting of one hectare. It is necessary that radish must be planted on ridges for better development of its roots. About 30 cm wide ridges should be prepared. A line with pointed stick about 2-3 cm deep is drawn on both side of ridges and seeds are put and covered with soil.

### **Time of sowing and varieties**

Time of sowing is an important factor for its rapid and successful growth. Crop sown on proper time, gave best germination. In case of early planting local varieties are available in the study area, where as in case of winter planting local as well as imported varieties are easily

available. In the study area only two varieties are commonly grown, i.e. "Japani" and "China". "Japani" imported variety is mostly planted in September- November. The "long white" desi variety is very popular and takes about 40 to 50 days in maturity. It was investigated that 90% respondents planted Japani variety and 10% planted China variety.

**Chemical fertilizer**

It was investigated that growers did not follow the recommendations made by agriculture department and mostly used fertilizer on their own experience. Tables 1 indicate that majority 54% growers applied below recommended dose of urea and 38% applied the recommended dose. The same pattern was found in DAP use, in which 16% growers applied above recommended dose and 84% applied to the recommended doze of DAP.

**Weed control**

The control of weeds is very important in the initial stage of the crop. Two hand weeding are commonly done by the growers with the help of Khurpi. It was investigated that thinning is normally practices where plant reaches at the height of about 4 cm. The distance between plant to plant should be maintained about 6-8 cm. The proper spacing helps in the development of healthy roots and ultimately higher yields obtained by the growers.

**Pesticide application**

During the survey it was found that growers had applied 1 to 5 pesticide sprays. It was investigated that 10% respondents did not applied any spray, whereas, 22% applied 1 spray, 44% 2 spray, 12% 3 spray, 8% 4 sprays and 4% 5 sprays in the study during the year 2003.

**Harvesting**

The harvesting of radish starts when the roots reach in the stage of edible or marketable. Delay in harvesting particularly in summer season; make the roots pithy and unsuitable for the market. This is short duration crop and takes about 40 to 50 days depending upon variety. One or two plants could be pulled out at random to see that roots are matured enough for harvesting. The skin of the root must mature to get better market prices. During harvesting and handling, it must be ensured that roots are not damaged. After mature of the crop, must be harvested immediately, otherwise rotting of roots will start. The harvested crop may be stored

Table 1: Application of fertilizer in radish

| Doze                   | Urea   |       | DAP    |       |
|------------------------|--------|-------|--------|-------|
|                        | Number | % age | Number | % age |
| Nil                    | 4      | 4     | -      | -     |
| Below recommended dose | 54     | 54    | -      | -     |
| Recommended dose       | 38     | 38    | 84     | 84    |
| Above Recommended dose | 4      | 4     | 16     | 16    |
| Total                  | 100    | 100   | 100    | 100   |

Source: Survey Data 2002-03

Table 2: Cost of production of selected growers

| Component costs           | (Rs ha <sup>-1</sup> ) |
|---------------------------|------------------------|
| <b>a) Fixes costs</b>     |                        |
| Water charges             | 193                    |
| Usher                     | 385                    |
| Zari tax                  | 495                    |
| Total fixed costs         | 1073                   |
| <b>b) Variable costs</b>  |                        |
| Ploughing                 | 1500                   |
| Leveling                  | 500                    |
| Ridge making              | 687                    |
| Land rent                 | 4500                   |
| Seed rate (kg)            | 2250                   |
| Sowing                    | 988                    |
| Urea                      | 1400                   |
| DAP                       | 1875                   |
| Tube well irrigation      | 350                    |
| Pesticide spray           | 1250                   |
| Manual weeding            | 1500                   |
| Harvesting                | 12750                  |
| Total variable costs      | 29550                  |
| <b>C) Marketing costs</b> |                        |
| Packing                   | 2250                   |
| Loading                   | 750                    |
| Transportation            | 3750                   |
| Unloading                 | 750                    |
| Commission                | 6000                   |
| Total Marketing Costs     | 13500                  |
| Total (a+b+c)             | 44123                  |

Source: Survey data, 2003

Table 3: Net return received by the selected grower

| Net return             | Amount |
|------------------------|--------|
| Quantity sold Mds /hac | 750    |
| Price Rs. / Mds        | 100    |
| Total Output Rs./hac   | 75000  |
| Total cost Rs./hac     | 44123  |
| Net return Rs./hac     | 30877  |

in a shady place to keep its freshness. It is difficult to adjust its harvesting according to the price situation in the market.

### Transportation

Radish is mainly transported through trucks to send the produce in the assembly markets. The entire produce is transported by road to the wholesale markets. It was reported that there are no losses when properly packed in the bundles. It was investigated that all of the growers

sent their produce to the assembly markets. It was reported by the grower that they received the better price of their produce from Local market. The transport charges vary from distance to distance. The average transport cost ranged between Rs.2.50-7.50 per 40 kg.

#### **Auction**

As soon as the radish reached in the market, the representatives of the commission agent approaches the truck and download in separate lots. The prospective buyers form a circle around the lot. The agent open one sample from each lot and allowed the buyers to check the top layer of the bundle. At the same time agent raised some slogans in favor of the produce, he intend to auction. When the buyers are satisfied with the quality of the fruit, the auction started. The auction conducted in the marketing is known as "open auction".

#### **Market information**

Timely and accurate information has been examined in this study. This is considered an important since any improvement in the quality and dissemination of marketing information should, in theory, improve both operational and pricing efficiency. The scarcity of market information limits the ability of the growers to take timely decision to market their own produce. The survey revealed that the traditional channel to acquire market information is a commission agent, neighboring grower, transporter and personal visit. It was found that 2% growers got information from commission agents, 12% from neighboring grower, 25% from transporter and by 61% paid personal visit of markets before sending their produce.

#### **Yield**

It was investigated that yield of radish varied from farm to farm. There are number of reasons for yield variation i.e. soil variation, land management, attack of insects, pests and diseases. It was estimated that the yield of radish crop ranged from 290 monds to 1230 monds with an average of 750 mds ha<sup>-1</sup>. The yield of radish could be increased as reported by the growers. It was found that 86% respondents reported that the production of radish could be increased by using improved methods of sowing while 14% reported that the production of radish could not be increased. It was also examined that there are number of factors, which help to increase the production of radish, 50% respondents reported by using quality seed, 08 and 28% reported good variety and balanced fertilizer.

#### **Price**

There is wide variation of price received by the radish growers. The prices of radish in early session are higher than the mid and late session but some times rate in early session becomes much lower than mid or later session. It was investigated that the sales price of radish in the early session was Rs.110 per 40 kg and Rs. 100 per 40 kg in mid session and Rs.90 per 40 kg in late season.

### **Economic analysis**

The economic analysis describes the methods used in analyzing economic behavior and the application of the results obtained to solve economic problems (David, 1979). Economic analysis deals with the cause and effect relationship of economic phenomena. It aims to formulate statement or principles as to what is true or correct under assumed condition. Economic analysis explains, for example how price is determined under conditions of perfect competition or monopoly, why business fluctuations occur and what force promote or retard economic growth (Thomas *et al.*, 1975). The objectives of economic analysis are to verify the use of various inputs of production and income incurred. There are many economic measures to determine the profitability of farm business. Yet none of them is perfectly suitable for all-purpose, some criteria are most suitable to derive certain conclusions. The most important criteria, which are commonly used to analyze efficiency of agricultural enterprise, are consumption of net return and determination of inputs, outputs ratio. These criteria were used to determine the economic efficiency of radish cultivation in Hyderabad district in Sindh during 2003.

Radish cultivation is an economic and resource allocation decision; it is not only to grow on the piece of land, but also to take proper care and application of inputs i.e. fertilizer insecticides and pesticides throughout the season. Growers have to decide whether they should allocate their scarce resources (Land, Labor, Capital and Machinery) to grow the radish or they should utilize these resources for other crops, taking account of both fixed and variable costs.

### **Fixed costs**

The fixed costs of radish were estimated by calculating the all costs incurred from initial establishment costs until it starts harvesting. The main costs involved are land development, labour and machinery costs. The land development costs included ploughing, planking, leveling and lay out of the field. The land rent, government taxes and markup on the fixed capital have been included in the fixed costs. The wages of permanent labour and repair of farm equipments and other miscellaneous costs were considered as fixed costs (Norman *et al.*, 1985).

### **Variable costs**

The variable cost consists of production practices, input costs including Seed, FYM, Fertilizer and pesticides. The wages for hired labor for irrigation, interculturing, spraying, harvesting and transportation and other management practices have been included in the variable costs. These costs are known as working capital, defined as to capital requirement to fund the production cycle (Nix, 1979).

The variable costs were collected from radish producers in Sultanabad area district Hyderabad Sindh. The Variable costs are those costs, which are specific to an enterprise and vary with its scale. The variable cost consists of land management, crop inputs, fertilizers, pesticides and irrigation. In addition, payments for hired labor for crop production activities. The variable cost varies from farm to farm, from one producer to another and from one crop to another, because some producer hired labor for harvesting and others engaged family labor.



### **Marketing costs**

Marketing costs are those expenses, which incurred by the growers when agricultural commodities move from producing area (farm gate to final consumer). This term frequently used to estimate expenditure incurred from the time of commodity leave the farm gate till it reaches to consumer's hands. Marketing costs included cleaning, grading, packing and transportation charges. The marketing costs of radish varied according to the distance of market.

### **Cost of production**

Total cost is defined as the fixed cost plus variable costs ( $TFC + TVC = TC$ ) (Bishop *et al.*, 1958). The total cost of production was determined to appraise the input-output relationship. For this purpose all costs incurred in the radish cultivation are aggregated and presented in Table 2.

### **Net return**

Net return refers to the residual, which remains for the entrepreneurs after subtracting all costs of production from its gross income. Net return was determined by subtracting average per hectare costs from average income per hectare realized by the growers. The net returns of radish growers are presented in Table 3.

The ultimate object of the present study is to improve the economic condition of resource poor farmers. It is only possible by increasing per hectare yield of radish crop as well as to encourage growers to adopt recommended production technologies. It is clearly indicated that cultivation of radish in the Sultanabad area of Sindh has a great potential because there is a better net return compare to other crops grown in the study area. Thus analysis indicated that this crop has a tremendous scope for further expansion in a relatively short period compared to other crops.

The fore going analysis indicated that improved management practices such as proper land development; quality seed, timely irrigation and use of adequate inputs are necessary to enhance the radish production. It was also investigate that most of the growers do not know the advantages of timely and adequate use of inputs. The use of chemical fertilizer and labor appear to be limited by the available resources with radish growers. It is therefore, suggested that proper dose of fertilizer, timely use of pesticide sprays, improvement of management operations are essential to achieve better production.

It was investigated that there is a lack of market information among radish growers in the study area. There are difficulties in communication; transportation and risk associated with the perishability and seasonality of radish are the major factors, which underline the positive price differences between wholesale markets. This study also indicated that due to perishability and seasonality and inadequate transport facilities, the transporters can collude on price setting, particularly in the peak harvesting period.

The improved high quality seed is an important indicator to achieve the good yield and quality produce and it is only possible by application of good and healthy seed. Therefore, there is need to select the well-trained staff to carry out the timely planting, timely harvesting,

grading, packing and timely marketing to get better prices.

Traditionally managed operations and sowing of local varieties are the main causes of low yield of radish in Sultanabad area of Sindh. There is a need to arrange the training of staff in respect of all management operations. There is a need to improve the existing information system and focus should be given to disseminate the information among growers regarding improved production practices and appropriate use of inputs in radish cultivation.

There is a need to motivate the growers of Sindh to grow more radish to earn high net returns in a short period of time. Given the difficulties in resources and extension services, it may be best to target such efforts at farm level. There is also a need to return the soil through the organic and inorganic sources. It is therefore suggested that growers seek guidance from local available resources such as, research stations, extension agents and progressive growers of the locality. The timely and proper application of FYM and chemical fertilizers and sprays to control the insects pests and diseases are important to achieve better crop yield.

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