Agriculture Update | February & May 2010 | Vol. 5 | Issue 1 & 2| 86-91 | RESEARCH ARTICLE

Investment analysis in grapevine orchards

B.S. NAVEEN, L.B. KUNNAL AND M.T. DODAMANI

See end of the article for authors' affiliations

Correspondence to :
B.S. NAVEEN
Department of Agricultural Economics, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA

ABSTRACT

The study was conducted in Bijapur district of Karnataka state with overall objectives of studying the feasibility of investment in grapevine orchards. Data were collected from 60 grape wine growers spread over in the district. The per hectare establishment cost were Rs. 3, 94,377.44. The total maintenance cost during bearing period was Rs. 1, 86,043.25. The average yield of grapevine orchards was 14.00 tonnes per hectare per year and average returns were Rs. 5, 29,787. The study further revealed that NPV for grapevine orchards was Rs. 16, 26,956, the B- C ratio was 2.2, Pay Back period was 3.2 years and IRR was 42.33 per cent.

Key words : Grapevine orchard, Investment, Cash inflows, Financial feasibility

Accepted : ***October, 2009***

INTRODUCTION

The wine industry in India is projected to grow at more than 30 per cent annually in next decade, the quantum jump from 2 million liters of wine production to 13 million litres in 2007. With the wine consumption in Karnataka recording a steady rise in the last few years, several wineries have evinced interest to invest in the state, even as five wineries would be fully operational by the end of the year. While two wineries are coming up at Devanahalli near Bangalore, one each in Koppal, Kolar, and Belgaum districts, at least three companies have shown interest in setting up wineries in the state. Following the spurt in the number of wineries, the Karnataka State Department of Horticulture is expecting the area under grapevine cultivation to increase from 700 acres at present to around 2,000 acres by the end of 2009.

The wine sales in the Karnataka, which was around 4.9 lakh liters in 2003-04, have exceeded 14 lakh liters during 2007-08,the sales figures include imported (both from outside the state and the country) wines and those produced in Karnataka.

Historically, grapevine (*Vitis vinifera* L.) is grown mostly for wine making in the world over. In India, on the contrary remarkable success has been achieved in table grape production and yield levels of fresh grapes are among the highest in the world. At present, in India grape is grown over an area of 60,000 ha with an annual production of 1.6 million tonnes.

In Karnataka, more than 12 varieties of grapes are used for wine making. Cabernet sauvignon, pinot noir, merlot, pinnotage, shiraz, zinfandel, chardonnay, chenin blanc and others are being cultivated by farmers who have contracts with the wineries. These varieties are mostly grown in Bijapur, Belgaum, Koppal, Baglkot, Bangalore rural and urban, and Chikkaballapur districts. Karnataka is the second largest producer of wine, next to Maharashtra. Many factors, such as the increasing consumption of wine and promotion of wine as a healthier drink, when compared to other varieties of alcohol have kindled interest for wineries to invest in Karnataka. If table grapes fetch Rs. 6 to Rs. 15 a kg to the farmer who harvests around 15 tonnes per acre, the wine varieties fetch Rs. 35 to Rs. 40 a kg and five to six tonnes can be harvested from each acre. These varieties require less water and are grown organically.

As the grapevine production involves heavy initial establishment and subsequent high maintenance expenses, its economic analysis is of great importance but the studies conducted on economics of grapevine production and investment pattern in wineries are very few. The present study is an effort in this direction of having an integrated study of all economic aspects of production grapevines and to identify the constraints faced by the grapevine producers and with an overall view of exploring the possibilities for bringing about the required improvement.

METHODOLOGY

Methodology followed for the study is described below:

Study area:

Bijapur district in Karnataka state was chosen for study purposively as it is the leading district with respect to both area and production of grapes. The area under grapevine cultivation in bijapur district is around 80 ha of 3305 ha total area under grape cultivation.

Sampling procedure:

Grapevine cultivation is emerging trend and practiced throughout the district. For the purpose of study, 60 grapevine growers spread over the district were selected randomly.

Nature and sources of data:

The data needed for the study were collected from the respondents by personal interview method using pre-tested schedule. Data were based on the entire operations in establishing and maintaining the grapevine orchards and the consequent costs and returns including constraints faced by grapevine growers.

Analytical tools and techniques employed:

To fulfill the specific objectives of the study, tabular presentation and financial analysis techniques were adopted. In financial analysis. Net Present Value/worth (NPV), Benefit-Cost Ratio (B: C Ratio), Internal Rate of Return (IRR) and Pay Back Period (PBP) were employed.

RESULTS AND DISCUSSION

The main findings of the study are presented in Table 1, 2, 3, 4, 5 and 6. The details of the findings on the establishment cost are presented in Table 1. The

Table 1 : Establishment cost of grapevine orchard

Sr. No.	Particulars	Unit	Qty	Cost	%
	Initial investment				
1.	Bore well			29743.67	7.54
2.	Pump set			19452.84	4.93
3.	Pump house			6583.94	1.67
4.	Sprayer			1967.64	0.50
5.	Drip irrigation system			20456.78	5.19
6.	Electric connection			10456.56	2.65
7.	Preparatory tillage	Pair days	7.41	1852.5	0.47
8.	Manures	Tonnes/ha	10	7500	1.90
9.	Fertilizers	Kg/ha	800	9600	2.43
10.	Pit marking	Man days	9.88	691.60	0.18
11.	Digging of pits	Machine hrs	17.29	11238.50	2.85
12.	Filling pits with FYM and fertilizers	Man days	61.75	6175	1.57
13.	Cuttings	No./ha	1980	12870	3.26
14.	Planting of cuttings	Man days	29.64	2964	0.75
15.	Stone pillars	No./ha	200.07	22453.85	5.69
16.	Training of stone pillars	Man days	30	3000	0.76
17.	Bamboo sticks	No./ha	1980	14949	3.79
18.	Errection of bamboo sticks	Man days	20	2000	0.51
19.	Trellis wire				
	8 Gauge	Kg/ha	205.01	11431.36	2.90
	10 Gauge	Kg/ha	244.53	16036.28	4.07
	12 Gauge	Kg/ha	197.60	14843.71	3.76
20.	Training of trellis wire	an days	49.40	4940	1.25
21.	Binding wire	Kg/ha	18.52	626.33	0.16
22.	Jute	Kg/ha	43.96	1244.68	0.32
23.	Angles	No/ha	200.07	34512.08	8.75
24.	Clamps	No/ha	200.07	5581.95	1.42
25.	Nut and bolts	No/ha	397.67	7205.78	1.83
	Total			280378.05	71.09
	Maintenance cost up to bearing period				
	1 Year			113999.39	28.91
	Total establishment cost (A+B)			394377.44	100.00

investment costs were considered for zero year and the maintenance cost (Table.2) was for one year period *i.e.* up to the bearing stage. They together constituted the establishment cost of grapevine orchard.

Per hectare total cost of establishment of grapevine orchard was found to be Rs.3,94,377.44. It was observed from Table 1 that the share of investment cost in the total establishment cost was Rs. 2, 80,378.05. It was mainly because of the high cost of trellis wire of different gauges (10.73 per cent) and angles (8.75 per cent). The investment on bore well (7.54 per cent), stone pillars (5.69 per cent), drip irrigation system (5.19 per cent) and pump set (4.93 per cent) were the other major items of establishment cost.

During the establishment period of one year, farmers incurred costs to maintain grapevine orchards. The maintenance cost incurred during this period was Rs. 113999.39 per ha of which variable cost was Rs. 83901.79 and fixed cost was Rs. 30097.60 (Table 2).

The total variable cost consisted of labour cost and material cost. Labour cost (Rs. 27748.7) accounted for 24.34 per cent and material cost (Rs. 49580.14) accounted for 43.49 per cent of the maintenance cost (Table 2).

Further, the major item of fixed costs was rental value of land, it alone accounted for 22.30 per cent to the total maintenance cost.

The grapevine orchard starts bearing from second year onwards. Maintenance cost of grapevine orchard during bearing period is presented in Table 3. The total annual cost incurred by the farmer in maintaining the grapevine orchard during bearing period was Rs.1,86,043.25.

It was observed from the Table 3 that the average cost of labour per ha was amounted to Rs. 50520.21 which formed 27.16 per cent of the total maintenance cost. The major contribution to this cost was made by the cost of application of plant protection chemicals (PPC) (Rs. 12967.5) which formed 6.97 per cent followed by application of fertilizers (3.32 per cent), application of FYM (3.05 per cent), pruning (2.66 per cent), watch and ward (2.39 per cent) and weeding (1.99 per cent).

Table 2 : Maintenance cost of grapevine orchard up to bearing period (for 1 year) (Rs. /ha)

Sr. No.	Particulars	Unit	Qty	Cost	%
I.	Variable cost				
A	Labour cost				
1	Intercultivation	Pair days	7.41	1852.5	1.63
2	Application of FYM	Man days	49.4	4940	4.33
3	Application of fertilizers	Man days	50	5000	4.39
4	Application of PPC	Man days	29.64	7410	6.50
5	Weeding	Man days	24.7	2470	2.17
6	Pruning	Man days	19.76	2964	2.60
7	Irrigation	Man days	37.05	2223	1.95
8	Miscellaneous			889.20	0.78
	Total labour cost (A)			27748.70	24.34
B	Material cost				
1	Manure	Tonnes	19.76	14820	13.00
2	Fertilizers	Kg	1811.33	21736	19.07
3	PPC	Liter	24.70	5681.22	4.98
4	Micro nutrients	Kg	113.20	6792.50	5.96
5	Others			550.42	0.48
	Total material cost (B)			49580.14	43.49
	Interest on working capital @ 8.5%			6572.95	5.77
	Total variable cost (A+B)			83901.79	73.60
II	Fixed cost				
1	Rent value of land			25422.25	22.30
2	Land revenue			24.70	0.02
3	Depreciation			2225.20	1.95
4	Interest on fixed capital @ 9.5%			2425.45	2.13
	Total fixed cost			30097.60	26.40
	Total cost (I+II)			113999.39	100.00

Table 3 : Maintenance cost of grapevine orchard during bearing period (Rs. /ha)

Sr. No.	Particulars	Unit	Qty	Cost	%
I	Variable cost				
A	Labour cost				
1.	Intercultivation	Pair days	12.35	3087.5	1.66
2.	Application of FYM	Man days	56.81	5681	3.05
3.	Application of fertilizers	Man days	61.75	6175	3.32
4.	Application of PPC	Man days	51.87	12967.5	6.97
5.	Weeding	Man days	37.05	3705	1.99
6.	Pruning	Man days	49.4	4940	2.66
7.	Shoot thing	Man days	29.64	2964	1.59
8.	Irrigation	Man days	49.4	2964	1.59
9.	Watch and ward	Man days	74.1	4446	2.39
10.	Harvesting	Man days	24.7	2470	1.33
11.	Miscellaneous			1120.21	0.60
	Total labour cost (A)			50520.21	27.16
B	Material cost				
1.	Manure	Tonnes	29.64	22230	11.95
2.	Fertilizers	Kgs	2099.5	25194	13.54
3.	PPC	Litres	37.05	8521.5	4.58
4.	Micro nutrients	Kgs	135.85	8151	4.38
5.	Others			602.54	0.32
	Total material cost			64699.04	34.78
	Interest on working capital @ 8.5%			9793.63	5.26
	Total variable cost (A+B)			125012.88	67.20
II	Fixed cost				
	Rent value of land			25422.25	13.66
	Land revenue			24.7	0.01
	Apportioned establishment cost			28780.53	15.47
	Depreciation			2548.64	1.37
	Interest on fixed capital @ 9.5%			4254.25	2.29
	Total fixed cost			61030.37	32.80
	Total cost (I+II)			186043.25	100.00

Intercultivation, shoot thinning, irrigation, harvesting and miscellaneous costs accounted for 1.66 per cent, 1.59 per cent, 1.59 per cent, 1.33 per cent, and 0.60 per cent of the total maintenance cost, respectively.

The total material cost accounted to Rs. 64699.04, to which cost of fertilizers made major contribution *i.e.* 13.54 per cent (Rs.25194) followed by FYM (11.95 per cent), plant protection chemicals (4.58 per cent), micronutrients (4.38 per cent), interest on working capital (5.26 per cent) and others (0.32 per cent).

The fixed cost amounted to Rs.61030.37, out of which apportioned establishment cost amounted to 15.47 per cent.

Yield and return structure in grapevines:

Per hectare yields of grapevines are presented in Table 4. The yield of grapevines varied with the age of vine. During the first year, the yield was zero. During second year, the yield was 5.43 tonnes and returns were Rs.2, 11,770. During third year, the yield increased to 10.86 tonnes and returns also increased to Rs. 4, 34,400. During fourth year, the yield was 13.58 tonnes and returns were Rs. 5, 43,200. During fifth year, the yield was 15.34 tonnes and returns were Rs. 5, 98,260. The yield was maximum in 6th year and it remained same up to 13th year, during this period the yield was 16.05 tonnes and returns for these years increased from Rs 6, 01,875 in sixth year to. Rs. 6, 38,790 in thirteenth year. During 14th and 15 year, the yields slightly decreased *i.e.*15.08 and 14.52 tonnes and returns were Rs. 5,95,660 and Rs. Rs. 580800, respectively.

Cash flows in grapevine orchards:

Cost incurred and returns obtained in grapevine

Table 4 : Yield and return structure in grapesvine

Sr. No.	Particulars (year)	Yield (t/ha)	Returns (Rs./ha)
1.	1	0	0
2.	2	5.43	211770
3.	3	10.86	434400
4.	4	13.58	543200
5.	5	15.34	598260
6.	6	16.05	601875
7.	7	16.05	613110
8.	8	16.05	617925
9.	9	16.05	621135
10.	10	16.05	625950
11.	11	16.05	629962
12.	12	16.05	633975
13.	13	16.05	638790
14.	14	15.08	595660
15.	15	14.52	580800

orchards are presented in Table 5. The annual costs increased from Rs. 1, 13,999 in first year to Rs. 2, 73,452 in the thirteenth year. The costs decreased slightly in the 14th year and 15th year. There were no returns from the orchard during first year. The orchard started yielding returns from the second year. The returns went on increasing year after year. It increased from Rs. 2, 11,770 in the second year to Rs. 6, 38,790 in the 13th year. The returns decreased slightly during 14th and 15th year. The net cash flows were negative in the first year. The net cash flows were positive in the second year and they went on increasing up to 13th year. The net cash flows which were Rs. 25727 in the second year increased to Rs. 3, 65,338 in the 13th year. The net cash flows decreased in the 13th and 14th year *i.e.* Rs 3, 25,424 and Rs. 3,12,348, respectively.

Financial feasibility of investment in grapevine orchards:

To evaluate the feasibility of investment in grapevine orchard, the criteria such as net present value, benefit-cost ratio, pay back period and internal rate of return were employed and results are presented in Table 6.

The net present value in grapevine orchard was Rs. 16, 26,956 per hectare at 9.5 per cent discount rate. The benefit cost ratio at 9.5 per cent discount rate was 2.2. The payback period was 3.2 years. This clearly indicated that it would take 3.2 years to recover the entire investment.

The IRR was found to be 42.33 per cent all these measures are clearly indicating that the investment in grapevine orchard is financially feasible.

Similar type of investigations were carried out by Chitra *et al*. (1997), Gummagolmath (1994) in India and Folwell *et al*. (2000) in USA.

Conclusion:

As the investment in grapevine orchards is financially feasible, the farmers, who wish to switch over to the establishment of grapevine orchard, may do so even if they have to borrow for establishing the orchards at the prevailing rates of interest from financial institutions.

Table 5 : Cash flows of grapevine

Year	Cash outflow	Cash inflow	Net cash flow	D.F at 9.5%	Discounted net cash flows
0	280378	0	-280378		
1	113999	0	-113999	0.913	-104081.09
2	186043	211770	25727	0.834	21456.32
3	219593	434400	214807	0.761	163468.13
4	245338	543200	297862	0.695	207014.09
5	250432	598260	347828	0.635	220870.78
6	254789	601875	347086	0.58	201309.88
7	259456	613110	353654	0.529	187082.97
8	263789	617925	354136	0.483	171047.69
9	265432	621135	355703	0.441	156865.02
10	267254	625950	358696	0.403	144554.49
11	269265	629962	360697	0.368	132736.50
12	271562	633975	362413	0.336	121770.77
13	273452	638790	365338	0.307	112158.77
14	270236	595660	325424	0.28	91118.72
15	268452	580800	312348	0.256	79961.09
	Total				1907334.11

Table 6 : Financial feasibility of investment in grapevine cultivation

Sr. No.	Particulars	Unit	Value
1.	Net present value (@ 9.5 %)	Rs./ha	1626956
2.	Benefit cost ratio (@ 9.5 %)		2.2
3.	Pay back period	Years	3.2
4.	Internal rate of return (RRR)	Per cent	42.33

Authors' affiliations
L.B. KUNNAL, Department of Agricultural Economics, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA
M.T. DODAMANI, Agricultural Research Station, DHARWAD (KARNATAKA) INDIA

REFERENCES

Bergonzi,G., Francolini,M. and Zaffignani, F. (1992). Costs of vineyard establishment: comparison of two low-growth systems in Emilia,Romagna. *Vignevini*, **19** (3) : 19-22.

Chitra, P., Narendra and Bal Reddy, K. (1997). Economics of Ber production in around Hyderabad city of Andhra Pradesh, India. *J. Agric. Eco.*, **52** (3) : 623-624.

Folwell, R. J., Gebers, B. D. and Wample, R. (2000). Grapevine production and marketing risks in Washington. *Small Fruits Review*, **1**(2): 3-17.

Gummagolmath, K.C. (1994). Economics of production and marketing of mango in Dharwad district, Karnataka. M.Sc. (Agri.) Thesis, University of Agriculture Science, Dharwad (M.S.) India.

****
****