Economics of Wicker Willow Cultivation as a Sustainable Livelihood Activity of Its Cultivators and Handicraft Makers in Ganderbal District of Jammu and Kashmir

Mudasir Rashid[1], Sajad A. Saraf[2*], S. Maqbool[3] and K. R. Dar[4]

[1]*Agricultural Economics, Faculty of Horticulture, SKUAST-Kashmir (J&K), India.*
[2]*Division of Agricultural Economics & Statistics, Faculty of Agriculture, SKUAST-Kashmir (J&K), India.*
[3]*Division of AGB, SKUAST-Kashmir (J&K), India.*
[4]*Division of Horticulture, Faculty of Agriculture, SKUAST-Kashmir (J&K), India.*

Authors' contributions

This work was carried out in collaboration among all authors. Author MR conducted the survey work, compiled the data and wrote the first draft of the manuscript. Author SAS designed the study, performed the statistical analysis, wrote the protocol. Authors SM and KRD helped in managing the analyses of the study, searching the literature and interpreted the results. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

The present study was carried out in four blocks, viz., Ganderbal, Sherpathri, Lar and Kangan of district Ganderbal of the Kashmir valley owing to the majority of wicker willow cultivators and handicraft makers in these blocks of the district. A total number of 120 respondents, i.e., wicker willow cultivators and handicraft makers were selected for the study. Data derived from the respondents were analyzed by using both descriptive and inferential statistics. Three main varieties of wicker willow species were determined in the study area, i,e., *Salix triandra, Salix dickymat* and *Salix viminalis*, with *Salix triandra* being the most prominent among the three as almost 53.33% of the respondents were cultivating this specie of wicker willow followed by *Salix dickymat* and *Salix*

Corresponding author: E-mail: sajad.saraf@rediffmail.com;

viminalis. During the cultivation of wicker willow, costs on preparation of land, planting material, fencing, FYM were applicable during the first year only, whereas, costs on fertilizer, weeding/cleaning were applicable throughout the crop life. During this study it was found that the inputs like planting material, fertilizers and weeding/cleaning had a direct impact on the total output of wicker willow. The study reveals that the average production of wicker willow was 768 kgs/kanal. The average cost of production was Rs 1170/kanal/year, whereas the average gross return stood at Rs 8256/kanal/year. The average net returns were estimated to be Rs 7086/kanal/year. Almost 44% of respondents were involved in making wicker handicrafts, which indicates that 44% of the respondents were accepting it as their main source of income. During this study, it was calculated that the payback period in case of wicker willow cultivation was 3rd year, whereas per rupee return was estimated to be Rs 3.19 and the ratio of benefit and costs was estimated to be 2.48, thereby making this practice as a profitable one when compared to other crops in the study area.

1. INTRODUCTION

Wicker willow, locally known as *veer kani* in Kashmir, belongs to the family *Salicaceae*. Wicker is the name commonly given to the one-year-old sticks that result from the willow prune. Generally, it is grown on cool, fertile, and irrigated lands; as it requires a large quantity of water, though it can withstand cold winter frost too. The wicker willow is worked on short-rotation coppice for production of pliable branches used for baskets, hurdles and fascines, etc. The wickers serve as raw material to small-scale industries for manufacturing of chairs, tables, sofa sets, baskets of various shapes and designs, flower vases and a variety of other fancy items [1]. Irrespective of geographical advantages, Ganderbal district in Kashmir valley provides the best soil and climatic conditions for the cultivation of willow wicker crop [2].

The willow plant is cultivated from saplings. Once a sapling sprouts, it is severed and sown into the land to harvest its shoots every year. The sapling continues to produce an annual harvest until it is uprooted. Usually, the saplings are sown during the months of February and March. A normal willow plant grows up 2-3 meters in its height and the crop is harvested in the month of October. Once the crop is harvested, the withy is grouped into bundles according to length and girth. The industrial processing starts from here and the crop is sold to a contractor who in turn assigns it to various artisans with the description of products that artisan has to make out of it. The wicker willow plantations are found in wetlands as well as those pockets where the chances of floods are prevalent. Farmers cultivate these plantations in paddy fields, so it clearly indicates that wicker willow has higher profitability than rice cultivation. The farmers also grow such cuttings as soil binding agents on the bunds of paddy fields, which suggest that such cultivations can also be used in agro-forestry systems. The most commonly grown specie of wicker willow in Kashmir valley is *Salix triandra* commonly known as Almond willow. Besides this, two more species are grown in the Valley, i.e., *Salix dickymat* and *Salix rubra* (in Srinagar and Ganderbal districts, respectively) [3].

Wicker handicraft- traditionally known as "*Shaakhsaazi*" is a prominent small-scale forest based cottage industry playing a vital role in livelihoods, socio-culture, employment, poverty alleviation and economy of stakeholders involved in this trade [4]. The wicker handicrafts, e.g., *kangri*, baskets, boxes, lamp-shades, curtain rings, trays, chairs, tables, cycle baskets, *etc.* have won worldwide acclaim for their exquisite designs, craftsmanship and functional utility. The local artisans, who are operating through their own convenient yardstick using traditional skilled human resources, machineries and supply of other local resources, mostly sustain the wicker handicraft-based small-scale cottage industries. The wicker handicraft being labour intensive in nature, this industry involves reasonably large number of people, thus it has a good scope to expand and generate employment opportunities in rural Kashmir. Despite, the small scale industries, traditional village industries, including modern small enterprises have been given an important place in the state's economic planning, some immediate and wise measures needs to be taken for solving the present problem and for sustained life of wicker handicraft in the region [5].

So far, there is dearth of research on wicker willow economy in Kashmir. In this backdrop, the present study entitled, "Economics of wicker

willow cultivation as a sustainable livelihood activity of its cultivators and handicraft-makers in Ganderbal district of Jammu and Kashmir" was conducted with the specific objectives: to i) investigate the economics of and resource use efficiency in wicker willow production, and ii) examine the motivational factors behind willow cultivation and identify constraints faced by the growers.

1.1 Importance of the Study

This study has been aimed to help in the determination of the economic conditions of the wicker willow cultivators, and generate baseline information to expand the development of traditional wicker handicrafts through technology refinement, value addition, and skill up-gradation. The findings will be of great importance for scientists, planners and policy makers for planning and implementation of wicker handicraft based industrial developmental projects for meeting ever-increasing demand of wicker handicrafts in Kashmir and elsewhere, and to formulate appropriate extension and communication strategies for effective dissemination of scientific innovations about wicker willow cultivation among entrepreneurs, and other stakeholders.

2. MATERIALS AND METHODS

The present study is an attempt to describe and quantify the various facets of wicker willow economics. Multistage stratified sampling procedure was adopted to select the samples. District Ganderbal of Kashmir was selected purposively, because of having more average land holding (0.40 ha/family) under wicker willow cultivation, with productivity of 12.69 tonnes/ha., higher than that of any other district in Kashmir. Moreover, the district experiences tremendous inclination of the farming community towards diversification of wicker willow cultivation.

2.1 Selection of Wicker Willow Cultivators and Handicraft Makers

During this stage of sampling, a list of wicker willow cultivators and handicraft makers in the selected blocks was complied. A group of 30 farmers from each block was selected randomly.

The data on cost of cultivation and returns from willow plantations was obtained from Forest Department and willow growers. The economics of willow cultivation was worked out on hectare basis with average planting density of 1270 trees per hectare for plantation meant for cricket bats, 20,000 plants per hectare for wicker willows and 17,600 plants per hectare for plantations raised for production of biomass energy.

2.2 Analytical Framework

To meet out the objectives of the present study, both tabular and functional/statistical approaches were employed for analysis and interpretation of results. The primary data collected through schedules were tabulated to workout averages, ratios, percentages and indices. Tabular technique was employed to determine the economics and resource use efficiency in wicker willow production, resource structure, input costs and disposal besides costs and returns on cultivation and processing.

Following regression equation was applied to determine the total production of wicker willow;

$$y = b_0 + b_i x_i + u$$

Where;

y = production of wicker willow (dry weight in kgs)
b_0 = intercept
b_i = regression coefficient for different inputs
x_i = i^{th} resources like planting material, FYM, urea, etc.
u = error term

Production of perennial crops is distinguished from annual crops by (i) the long gestation period between the initial investment and first output, (ii) an extended period of output flow, and (iii) varying stages of productivity over the lifetime. Because of these special characteristics, the tools of economic analysis applicable in the case of annual crops cannot be applied as such in the case of perennial crops. Economic feasibility analysis is the most commonly used method for determining the efficiency of a project. It helps in identifying profit against investment expected from a project. Cost and time are the most essential factors involved in this field of study. To evaluate the economic feasibility of willow, the following important indicators were used:

Pay Back Period (PBP): It is the number of years an investment project takes to recover its costs from its returns. The payback period is the length of time in years required to liquidate the

investment estimated by summing up all the discounted net returns over the years to make up the initial investment.

Net Present Value (NPV): This is considered to be a more meaningful measure of appraising the long-term investment proposal and is useful in comparing the different investment proposals. It is the difference between the present value of benefits and initial investments. If the appraisal shows NPV greater than zero, the project is economically viable, as it can generate returns in excess of all the costs.

$$NPV = \sum (B_t - C_t) / (1+r)^t$$

where,

R_t = is the returns from the plantation in period t.
C_t = Costs incurred during the period t.
r = required rate of return or discounting rate
n = Period or number of years of the project.

The Benefit Cost Ratio was worked out as per following procedure.

2.2.1 Benefit-cost ratio (BCR)

It is the ratio of the present value of benefits to the present value of all costs during the life of the project.

$$BCR = \sum \frac{B_t / (1+r)^t}{C_t / (1+r)^t}$$

The criteria adopted to deem the willow plantation project as worthwhile:

➤ PBP should not be greater than the investor's desired PBP.
➤ NPV should be positive and greater than zero.
➤ BCR should be positive greater than unity.

If all these criteria are fulfilled then the investment project will be justified as profitable and economically feasible [6].

The returns from willow plantations raised for different end uses were worked out with an assumption that the raw material would be either sold to cricket bat manufacturing units or wicker weavers/ weaving units or wood-fuelled electricity and heating plants or retained for longer periods to earn carbon credits. A spreadsheet model [7] which represents standard cash flows for different silvicultural regimes and allows other factors to be varied (such as price per unit volume/ weight of raw material) was also used for this analysis. The output from the model was worked out in two forms; discounted cash flows (DCF) and equivalent annual annuity (EAA) values. DCF analysis was chosen to reflect the long-term nature of willow plants as an enterprise and the unevenness of the cash flow in establishment years.

$$\text{Equivalent annual annuity} = \frac{r(NPV)}{1-(1+r)^{-n}}$$

The profitability function was used to evaluate the net annual income from plantations managed for 'C' sequestration at a population density of 1270 trees ha^{-1} [8].

$$VT = \sum_{t=0}^{T} [(\Delta St + \Delta Bt) PC + Ht PH - C Mt] (1+r) - t - CE$$

where,

St is soil carbon content (tons ha^{-1})
Bt is above ground biomass in year t (tons ha^{-1})
Δ represents annual change
Ht is the quantity of product harvested during year t.
PC is the price of carbon
PH is the price and
CMt is annual maintenance cost
CE is establishment cost

3. RESULTS AND DISCUSSION

The three main varieties of wicker willow found in the study area were *Salix dickymat, Salix triandra* and *Salix viminalis,* with *Salix dickymat* being the most prominent as almost 53.33% of the respondents were cultivating this specie of wicker willow. The cultivation of wicker willow mainly included the costs like preparation of land, fencing, FYM, plants and planting material, fertilizers and weeding/cleaning costs (Table 2). The costs like fertilizer costs and weeding/ cleaning costs were applicable throughout the crop life, whereas, the remaining costs were applicable only during the first two years. Weeding/ cleaning costs contributed the highest (Rs. 4860.00), whereas, fencing costs contributed the lowest (Rs. 980.00) to the total cultivation costs per *kanal* during the crop life. On an average, the wicker willow plantation is an eight-year-old plantation. The returns from wicker

willow starts from 2nd year; i.e., the wicker willow is usually harvested from 2nd year onwards. The average production of wicker willow was determined to be 768 kgs./*kanal*/year. The average cost of production stood at Rs. 1170/*kanal*/year, whereas, the average gross return were Rs. 8256/*kanal*/year. The average net returns were Rs. 7086/*kanal*/year (Table 3). Most of the value addition costs were involved in round tokri large followed by round tokri small; the least value addition costs were involved in round tokri small.

The value addition of wicker willow determines the sum total of processes like boiling, debarking, drying, sorting, transportation and labour, which are involved in making the wicker handicraft. At least 30-40 wicker handicrafts were determined in the study area out of which there were nine major wicker handicrafts, which were produced throughout the year.

All these measures clearly indicated that the investment in wicker willow production was a profitable venture. Economic feasibility measure like payback period (PBP), net present value (NPV), internal rate of return (IRR) and benefit cost ratio (BCR) were calculated for this project and have been depicted in Table 5. The analysis revealed that the payback period in case of wicker willow cultivation is 2.76 years, per rupee return at Rs 3.19 and the benefit-cost ratio came out as 2.48. The results also indicated that the NPV is positive, BCR is greater than one and IRR is sufficiently higher than prevailing interest rate of banks, thereby making this practice as economically viable.

The coefficient of determination (R^2) determined that the variables like planting material and fertilizers were having a direct impact on the total production, i.e., with the increase in these two variables, the total production would also increase and vice versa. The yield of any production system depends on multiple factors, which include both controllable and non-controllable factors. Here, the most relevant and yield determining factors were taken into account

Table 1. Categorization of wicker willow cultivators and handicraft makers in selected blocks

S. No.	Name of the block	Wicker willow cultivators	Wicker handicraft makers	Both wicker willow cultivators and handicraft makers	Total respondents
1.	Ganderbal	12	8	10	30
2.	Shearpathri	16	4	0	30
3.	Lar	8	14		30
4.	Kangan	4	20		30
Total		**40**	**46**	**4**	**120**

Field survey, 2018

Table 2. Year wise cultivation costs in wicker willow (Rs./kanal)

Particulars	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Total
Preparation of land	1600	0	0	0	0	0	0	0	1600
Farm Yard Manure	550	500	0	0	0	0	0	0	1050
Plants/ planting material	2300	0	0	0	0	0	0	0	2300
Fencing	980	0	0	0	0	0	0	0	980
Fertilizers	360	400	435	413	517	481	520	550	3676
Weeding and cleaning	0	0	770	765	810	845	820	850	4860
Total	5340	900	1205	1178	1327	1776	1340	1400	14466

Note: Cost of cultivation analysis done using variable cost components only. 1 kanal= 0.05 hectare

Table 3. Average yearwise returns from wicker cultivation (Rs. per kanal)

Year	Returns	Year	Returns
1	0	5	5760
2	3286	6	8650
3	6440	7	9210
4	7285	8	5666

and regressed with the dependent variable yield to estimate their contribution and resource use in production process so as to arrive at valid conclusion regarding the input use and management in the wicker willow cultivation. Table 4 depicts the estimates of the key parameters which effects on the yield of wicker willow. The regression results while explaining determinants on yield, six parameters, viz., fertilizers, weeding and cleaning, planting material, FYM, Preparation of land and fencing are regressed with total production. The results indicated that fertilizer and planting material had positive and significant effect on the yield. However, weeding and cleaning show negative

effect on total production which implies that respondents are either harming or not conducting this practice in a proper way. FYM, preparation of land and fencing also show insignificant effects on total production. The R^2 value turned to 87.96 per cent.

Many motivational factors were present which made the respondents of the study area to cultivate wicker willow. The major motivational factors are depicted in Table 6, and have been ranked from 1 to 9 on the basis of their weighted mean score (WMS). The analysis of results revealed that the most important motivational factor in cultivation of wicker willow was 'easy

Table 4. Resource use efficiency in wicker cultivation

Independent variables	Estimated coefficients	P values
Fertilizer	1.35	0.045*
Weeding and cleaning	-0.45	0.378
Planting material	8.62	0.015*
Farm Yard Manure	2.96	0.171
Preparation of land	0.18	0.863
Fencing	0.18	0.922
R^2 (%)	87.96	
Adjusted R^2 (%)	86.23	

significance at 95% level of confidence

Table 5. Economic feasibility measures of wicker willow

S. No.	Financial ratios	Values
1	Payback period (PBP) (Year)	2.76
2	Net present value (NPV) (Amount in Rupees)	14729.94
3	Internal rate of return (IRR)	16.34%
4	Benefit cost ratio (BCR)	2.48

Table 6. Perceived rank order of the motivational factors for wicker cultivation

S. No.	Factors	Degree of effectiveness			Weighted mean	Rank
		Most effective (2)	Effective (1)	Least effective (0)		
1	Employment generation	71(59.17%)	33(27.5%)	16(13.33%)	1.45	4
2	Income generation	64(53.33%)	41(34.17%)	18(15%)	1.40	5
3	Poverty alleviation	45(37.50%)	29(24.17%)	46(38.33%)	0.99	8
4	Socio-economic development	47(39.17%)	37(30.83%)	36(30%)	1.09	7
5	Less capital intensive	83(69.17%)	27(22.5%)	10(8.33%)	1.60	2
6	Easy raw material & machinery procurement	87(72.50%)	22(18.33%)	11(9.17%)	1.63	1
7	Extension & training for skill up gradation	22(18.33%)	37(30.83%)	61(50.83%)	0.67	9
8	Preservation of traditional art craft	76(63.33%)	35(29.17%)	09(7.5%)	1.55	3
9	Utilization of free time	51(42.50%)	63(52.5%)	06(5%)	1.37	6

Table 7. Perceived constraints in the cultivation of wicker willow

S. no.	Factors	Degree of seriousness			Weighted mean	Rank
		Most serious (2)	Serious (1)	Least serious (0)		
1	Lack of modern techniques	43(35.83%)	59(49.17%)	18(15%)	1.21	4
2	Influence of middlemen	67(55.83%)	39(32.5%)	14(11.67%)	1.44	3
3	Seasonal subsistence	12(10%)	38(31.67%)	70(58.33%)	0.52	8
4	Supplementary income	39(32.5%)	53(44.17%)	28(23.33%)	1.09	5
5	Limited marketing facilities	68(56.67%)	47(39.17%)	05(4.17%)	1.53	1
6	Scarcity of transportation facilities	21(17.5%)	77(64.17%)	22(18.33%)	0.99	7
7	Lack of funding - finance and subsidies	72(60%)	29(24.17%)	1915.83%)	1.44	3
8	Labour intensive and less remunerative livelihood activity	66(55%)	47(39.17%)	07(5.83%)	1.49	2
9	Lack of co-operative societies	31(25.83%)	68(56.67%)	21(17.5%)	1.08	6

raw-material availability and machinery procurement' (WMS 1.63); which was ranked at one, followed by 'less capital intensive; (WMS 1.60), 'preservation of tradition art craft' (WMS 1.55), 'employment generation' (WMS 1.45), 'income generation' (WMS 1.40), 'utilization of free time' (WMS 1.37), 'socio-economic development' (WMS 1.09), 'poverty alleviation' (0.99), and 'extension/training for skill upgradation' (WMS 0.67), ranked from 2 to 9, respectively.

The production of wicker handicrafts involved a number of constraints faced by the respondents. These constraints were ranked from 1 to 9 based on their weighted mean score (WMS). Analysis of the results, reflected in Table 7, reveal that the most frequent constraints faced in the production of wicker handicraft were 'limited marketing facilities' (WMS 1.53), ranked first, followed by 'labour intensiveness and less remunerative livelihood activity' (WMS 1.49), 'lack of funding 'and 'influence of commission agent' (WMS 1.44), 'lack of modern techniques' (WMS 1.21),'no supplementary income' (WMS 1.09), 'lack of cooperative societies' (WMS 1.08), 'scarcity of transportation facilities' (WMS 0.99), and 'seasonal subsistence' (WMS 0.52), which were ranked from 2-8, respectively.

4. CONCLUSION

- From the study it is found that the inputs like planting material, fertilizers and weeding/ cleaning had a direct impact on the total output of wicker willow.
- The payback period in case of wicker willow cultivation was 2.76 years, whereas per rupee return was Rs 3.19 and the ratio of benefit and costs was 2.48. All these

indicators revealed that this practice was a profitable one as compared to other crop enterprises of the district, and thereby could be recommended for extending it to other areas as well.

- The encouraging factors of wicker handicraft, viz., easy raw material and machinery procurement, income and, employment generation, poverty alleviation and socio-economic development were considered 'most effective' by most of the wicker handicraftsmen, because of their direct impact on their subsistence, income, standard of living, well-being and survival. On the other hand, migration check, preservation of traditional art/craft, less capital intensive, utilization of free time, easy raw material and machinery procurement, extension and training for skill upgradation, extensive promotion and support by Government and funding, finance and subsidies were the factors considered 'effective' in encouraging the wicker handicraft among most of the wicker handicraftsmen.
- The 'most serious' constraint of wicker willow production encountered by the wicker cultivators were limited marketing facilities, labour intensiveness and less remunerative livelihood activity, seasonal subsistence, limited marketing facilities and unsafe and unsecured working environment, as these factors seems to have alienated some people from undertaking the wicker handicraft. The constraints of wicker handicraft based livelihood, viz., lack of co-operative societies, lack of modern techniques, lack of finance and subsidies, lack of access to use forest resources, influence of

middlemen and scarcity of transportation facilities were experienced as 'serious' among sampled population in the study area.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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