On the Economic Benefits of Cut Roses Planting in Sanya

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Abstract The study aims to promote the off-season cut roses industry in Hainan Province to the whole island and even whole China. Based on the production data in latest three years, the theory of time value was introduced to analyze the economic benefits of cut roses planting in South Hainan. According to the research findings, the cut roses create a NPV of ￥22 000/667 m^2 with a net NPV rate of 34.24%, an internal rate of return of 76.36%, and a dynamic payback of 1.05, bringing the farmers a revenue of ￥7 200/667 m^2 per capita per year. Since the large-scale planting of cut roses needs a high investment, it is suggested that the government should increase its support for the cut rose industry.
Key words Off-season, Time value, Cut rose, Net present value rate, Hainan

The best temperature for planting cut roses is 15 - 28 ℃[1], and South Hainan Island, which is located between 15° and 18° N and has a temperature of 19℃ to 24℃ in spring and winter, provides favorable light and temperature conditions for the growth of cut roses. Cut rose, one of the great cut flowers in the world[2], is famous for its varied colors, wide range of application, and small fluctuations of price. Its sales rank the first place in international market of cut flowers[3]. According to the analysis of ITC's Market Analysis Tools, the sales of cut roses were increasing year by year, amounting to $ 2 894 085 000 in 2011, 6.261% more than that in 2007. In the planting bases of Yunnan and Guangdong Provinces where the temperature is too low to grow the roses from December to next March, high - quality cut roses were in short supply, and have to be planted in greenhouses to guarantee their yield and quality. That is why the off-season roses produced in South Hainan show great comparative advantages. What's else, to plant roses in this area costs much less, and the off-season roses will not only effectively reduce the supply - demand conflicts on rose market, but also promote the rural economic development in Hainan Province, increase the farmers' incomes and optimize the economic structure in local rural areas. With great practical significance, the rose planting industry will contribute to constructing an international tourism island of Hainan. Based on the data of cut roses production in the latest three years, the paper carried out an analysis on the economic benefits of cut roses industry in South Hainan Province.

1 Status quo of cut roses industry in Hainan Province

Hainan provincial government adopted a series of measures to support and encourage the development of flower industry. In December 2009, the government proposed two programs to develop the tropical modern agriculture. According to the statistics published by the Forestry Bureau of Hainan Province, the "National Production Base of Fresh Cut Flowers" and the "National Production Base of Tropical Orchid" have been established in Haikou and Sanya, and six different local standards for flowers planting have been implemented, and a modern production mode of "enterprises + flowers cooperatives + flower farmers + standardization" has been formed. In whole Hainan Province, the total planting area of flowers has exceeded 6 000 hm^2, and the quantity of flower enterprises has reached 556, influencing 4 317 farmers, employing 29 000 staff and creating an annual sales of 0.8 billion yuan. But still the development of Hainan flower industry is still at its initial stage. After nearly five years' development in Sanya, eight species, including Carola, Tineke, Black Magic, Samantha, *etc.*[4] were selected, whose planting area exceeds 87 hm^2, 20 hm^2 in Wuzhishan, 7 hm^2 in greenhouse, and some in Baoting County and Wanning City. In addition, the Fifth Session of Chinese Rose Exhibition & 2012 Regional Conference of World Rose Federation was held from December 12 to 15, 2012.

2 Analytic process

According to the actual situation of cut roses planting, the input of rose production should be refined, and the theory of time value[5-6] should be introduced to analyze the costs and revenue in details. Related data, including NPV (Net Present Value), NPVR (Net Present Value Ratio), IRR (Internal Rate of Return) and (Dynamic Investment Pay - back Period), should be calculated.

2.1 Analysis of production costs The costs cover the land rent, money spent on seeds, agricultural materials and machineries, and wages. Cut roses belong to the woody perennial evergreen shrub of flowering plant and their crafted seedlings generally need seven to eight years to regenerate. By categorizing the costs, the production input in 2009, 2010 and 2011 were checked, predicted, and then corrected. The details can be found in Table 1.

2.2 Analysis of sales The cut roses are planted in January to March, grow for about six months from April to October and finally

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harvested in about November or December. In the first year, there are about 15 000 plants/667 m^2 fresh cut flowers and 55 000 plants in the second year. The figure will increase to 60 000 plants in the third and fourth year as a result of technical innovation and mature skills, and reduce to 55 000 plants in the fifth year due to the update of plants. The purchase price is 0.75 Yuan per plant in the first and second year, and will be estimated to decrease to 0.65 Yuan per plant as a result of expanding planting scale. The total sales are checked and predicted based on the latest two years, and the details can be seen in Table 2.

Table 1 Production cost constitutes of cut roses in Sanya

No.	Category of costs	Basis and method for calculating (area: 667 m^2)	Total (¥)
①	Rent	Sand land	1 500
②	Seedlings cost in the first year	7 yuan per 15cm crafted seedling, a total of 2 300 seedlings per 667 m^2	16 100
③	Input of agricultural materials and machineries in the first year	¥1 200 for fertilizer, ¥600 for pesticide, ¥1 040 for soil improvement, ¥90 for trapping plate, ¥800 for irrigation facilities, ¥200 for insecticidal light, ¥150 for agricultural materials and ¥1 050 for packaging materials	5 130
④	Microbial agents	Twice a year, ¥300 each time	600
⑤	Input of agricultural materials every year	¥1 800 for fertilizer, ¥1 200 for pesticide, ¥300 for irrigation facilities	3 300
⑥	Wages	¥1 500 per worker per month for managing 2.5 × 667 m^2 land; ¥4 000 per technician per month for managing 40 × 667 m^2 land	8 400
⑦	Water and electricity	¥60/667 m^2	60
⑧	Cost of seedlings per year	180 plants per year	1 260
⑨	Cost of packaging material per year	60 000 plants/667 m^2, each plant needs 0.03 yuan/plant	1 800
⑩	Maintainance of equipments	¥300 for irrigation facilities, ¥100 for insecticidal light and diesel machine	400
	Input at the first year	① + ② + ③ + ④ + ⑥ + ⑦	31 790
	Input from the second to the fifth year	① + ④ + ⑤ + ⑥ + ⑦ + ⑧ + ⑨ + ⑩	17 320

Table 2 Sales in five years (area of 667 m^2)

Item	1st year	2nd year	3rd year	4th year	5th year
Yield	1.5	5.5	6.0	6.0	5.5
Price//Yuan/plant	0.75	0.75	0.65	0.65	0.65
Revenue//10^4 Yuan	1.125	4.125	3.900	3.900	3.575

3 Results and analysis

3.1 NPV, IP and NPV rate The analysis was carried out based on the investment of every 667 m^2 in three years. (the actual period of return is about six to eight years). The details can be seen in Table 3.

Table 3 Cash flow statement of the project

Year n	Input 10^4	Cash inflow 10^4	Cash outflow 10^4	Net cash flow 10^4
0	3.179	1.125		−2.054
1		4.125	1.732	2.393
2		3.900	1.732	2.168

$$NPV = \sum_{t=0}^{n} (CI - CO)_t (1 + t)^{-t}$$

CI—Cash inflow

CO—Cash outflow

(CI − CO)t—Net cash flow at the tth year.

n—given period = 3

ic—benchmark yield = 5.0%

NPV = −2.054 + 2.393(P/F, 5.0%, 1) + 2.168(P/F, 5.0%, 2) = −2.054 + 2.393 × [1 ÷ (1 + 0.05)1] + 2.168 × [1 ÷ (1 + 0.05)2] = 2.191 (10^4 yuan)

IP = 3.179 + 1.732(P/F, 5.0%, 1) + 1.732(P/F, 5.0%, 2) = 3.179 + 1.732 × [1 ÷ (1 + 0.05)1] + 1.732 × [1 ÷ (1 + 0.05)2] = 6.399 5 (10^4 yuan)

NPVR = NPV/IP = (2.191 ÷ 6.3995) × 100% = 34.24%

3.2 Internal rate of return The value was taken when IRR was a certain value and NPV = 0. When IRR > ic, the program is economically reasonable and acceptable.

$$\sum_{t=0}^{n} (CI - CO)_t (1 + IRR)^{-t} - O$$

$$-2.054 + 2.393(P/F, IRR, 1) + 2.168(P/F, IRR, 2) = 0$$

$$-2.054 + 2.393 \times [1 \div (1 + IRR)1] + 2.168 \times [1 \div (1 + IRR)2] = 0$$

It was calculated by interpolation: IRR = 76.355% > > ic (5.0%).

3.3 Dynamic investment pay − back period According to Table 2 and Table 3, the accumulated present value of net cash flow was obtained by the theory of time value, which can be seen in Table 4.

$$\sum_{t=0}^{P_t} (CI - CO)_t (1 + i_c)^{-t} = O$$

Table 4 Accumulated present value of net cash flow

Year	Net cash flow//10^4	NPV of cash flow//10^4	Accumulated NPV of cash flow//10^4
0	−2.054	−2.054	−2.054
1	2.393	2.393 × [1 ÷ (1 + 0.05)1] = 2.279	−2.054 + 2.279 = 0.225
2	2.168	2.168 × [1 ÷ (1 + 0.05)2] = 1.966	0.225 + 1.966 = 2.191

The present value of net cash flow was 22 500 Yuan in the second year. P'_t = (Years of positive value of net cash flow − 1) + (absolute value of accumulated net cash flow in last year/that in present year) = (1 − 1) + 2.054/1.966 = 1.05.

4 Conclusion and discussion

The off-season cut roses in Hainan have achieved good economic benefits, creating about RMB ¥22 000/667 m^2 NPV in three years, with a NPVR of 34.24%, an internal rate of return of 76.36%, and a dynamic investment pay − back period of 1.05 year.

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reduce flower logistics costs, reduce the loss of flowers, and maintain the overall flower quality.

5.2 The standardization of flower production Every step in flower production, harvesting, packing, loading, transport, storage and other aspects should be standardized. In China Floral Index Network (http://www.hmindex.cn/), there are standards for Wenjiang floral, wood and seedling industry. This standardization is expected to promote the development and improvement of national standard.

5.3 The establishment of franchised floral stores Yunnan Jinyuan Flower Industry Co., Ltd has become the largest floral enterprise of cut flower production, post-harvest processing and sales, with more than half of total sales of cut flowers in Yunnan's trade. The collaboration with other big floral enterprise such as Yin-mao flowers, Yunnan Li-DUO flowers, friendship flowers and other well-known enterprises in Yunnan can play full strength to create a chain of floral stores across the country. This will not only help to build Yunnan Flower brand, but also benefit the nearest delivery of floral orders placed in online shops[5]. This could ensure the quality of online shopping flowers, enhance the credibility of floral e-commerce and render flowers similar to other commodities which could be easily and conveniently purchased by online customers.

6 Conclusions

Flower e-commerce is currently centered on Taobao e-commerce platform. The online order is usually delivered by the local entity floral stores, while the flower store find their resources from wholesalers. There are too many intermediate links from the production to the customers, which has a great impact on the quality of flowers and flowering period of the product. When a consumer receives flowers dramatically different from the online samples, it is difficult to return the goods and get the refund as there are no "three guarantees" fro floral products and no uniform flower standards. Thus in order to make floral product into a common goods which could be purchased by online customers with confidence, national standards for flower should be enacted, the circulation process should be simplified, specialized floral logistics system should be established to reduce the transport cost.

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The cut roses industry also makes great contributions to the society, bringing the farmers an annual income of RMB ¥7 200/667 m^2 per capita, far above the average net income of farmers in Sanya and even whole Hainan Province in 2010.

However, the planting of cut roses in Sanya calls for high investment, which is about RMB ¥32 000/667 m^2 in the first year and RMB ¥17 000/667 m^2 every following year. Thus, it needs both the financial and political support. Meanwhile, it is also suggested that the farmers'cooperatives should be established to promote the sales of cut flowers and enhance their competitive advantages.

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