

# Trade in agricultural technological innovations in the context of intellectual property regime

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## Abstract

**Objectives:** The study is to assess the likely impact of the payment of royalty for trade mark obtained by the Theo Ruys Management & Holding B.V, a Netherland Company for rose varieties on rose cultivation and its profitability in Tamil Nadu State of India.

**Methods and Statistical Analysis:** The study heavily relied on time series data gathered from various published sources. Data were also collected by personal discussion with various stakeholders. Export instability in terms of quantity and value, unit value realization, cost and returns of rose cultivation and sensitivity analysis of costs and returns of rose cultivation incorporating the royalty payment were analyzed by estimating the averages and co-efficient of variations.

**Findings:** India's rose export is phenomenal in the recent years due technological and policy supports nevertheless the fact remains that there is inconsistent supply but India continues to supply roses to major markets. No doubt, rose cultivators are realizing higher benefits and my conservative estimates say that farmers gained ₹12.99 lakh per acre of land per annum with a benefit –cost ratio of 1.36 ultimately farmers are attracted to this locative business of production of roses. As a result, India continues to export roses however; payment of ₹1.20 per spike exported may result in losing the export market because the farmers incur loss in rose cultivation. The question remains that whether the small and marginal farmers should be exempted from paying such royalty? Does it feasible under the present IPR regime? Though India was exempted to avail certain benefits under WTO including the enacting its own IPR act under sui generis system to protect plants and conserve traditional germplasm, this type of demand would be possible under WIPO? Only alterative suggestions are gearing up the public R&D with professionalism to develop promising rose varieties suitable for export market with export quality traits and technology dissemination processes.

**Applications and Improvements:** Most of the earlier studies dealt with the economics of production and marketing of rose flowers wherein to some extent efficiency parameters such as technical, allocative and economic efficiencies were estimated. However, the present paper deviates from other studies and brought out the issues of IPR and its impact on domestic production and trade.

**Keywords:** Trade mark, rose export, export variability, costs and returns of rose cultivation.

## 1. Introduction

Concern is raised by the small and marginal farmers of Krishnagiri district of Tamil Nadu that they have to pay royalty to the tune of ₹85 per plant as onetime payment per plant or ₹11 per annum per plant. In addition, the farmers have to pay ₹1.20 per rose exported to Theo Ruys Management & Holding B.V, a Netherland Company [1]. The company is operating in India through dealers namely Professional Agrotech for Talegaon region of Maharashtra and Moerheim Roses and Trading India Pvt. Ltd. at Bangalore for Karnataka and at Hosur for Tamil Nadu and North Eastern Region. The company imposed the royalty payment due to large scale cultivation of rose varieties belonging to this company as the company obtained trade mark for those rose varieties. Further, such royalty was imposed since the rose plants of those varieties are vegetatively propagated and cultivated by the farmers as result the company is losing the rights of ownership.

## 2. Objectives

The prime objective is to assess the likely impact of payment of royalty to the company due to trade mark obtained for rose varieties on rose cultivation and its profitability. The issue was analyzed by examining the public R&D investment, varietal development and adoption and export performance in-terms of quantity, value and unit price realization.

## 3. Methods and Statistical analysis

Time series data on R&D expenditure on horticulture over the plan periods, rose varieties cultivated in India, area and production of roses in various districts of Tamil Nadu, rose varieties with trade mark of the said company [2], export of cut roses in terms of quantity and value including the unit price and export market destinations were collected from the various websites sources of Department of Agricultural Research and Education (DARE) [3], various issues of Agricultural Statistics at a Glance [4], National Horticulture Mission [5], various issues of Hand Book on Horticultural Statistics [6] and Ministry of Commerce and Industry [7]. Data were also collected by personal discussion with various stakeholders. Export instability in terms of quantity and value, unit value realization, cost and returns of rose cultivation and sensitivity analysis of costs and returns of rose cultivation incorporating the royalty payment were analyzed by estimating the averages and co-efficient of variations.

## 4. Findings

### 4.1. R&D Investment and Varietal development

Farmers of Krishnagiri District of Tamil Nadu are exacerbating that the payment of royalty as imposed by the company will lead to farmers losing the business in rose export ultimately they have to give away the rose cultivation, presently lucrative, since they have been cultivating the said company's varieties for a longer time due to their export quality traits. Further, the farmers were of the opinion that the role of public sector in development of export-oriented quality rose varieties is negligible despite the fact that huge amount of investments have been pumped into floriculture R&D.

No doubt, development of production technology and market infrastructure for horticulture brought out resilience in horticulture production particularly floriculture in the country. Flower cultivation is mounting in the country steadily and India is emerging as the second largest producer in the world surpassed only by china due to concerted efforts of the government. There has been a concomitant increase in the investment cost due to advancement in production and marketing of horticulture particularly the floriculture. High investment requirements for floriculture attracted higher level of both public and private investments over the period. The public investment on horticulture during the IX plan period was only 4% of the plan outlay allocated for agriculture and allied activities and it was increased to 11.6% during the XI plan period but during the XII plan period it was reduced to 4.6% (Tables 1-2). Investment on R&D is also increasing and to develop area specific varieties ICAR is operating All India Coordinated Floriculture Improvement Project on crop improvement, standardization of agro-techniques including improved propagation methods, plant protection and post-harvest management involving many agricultural universities.

Table 1. Expenditure on horticultural research and development (₹ in Crore)

Head	Eleventh Plan						Total XI Plan
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
Plan	320.77	75.60	90.00	98.00	124.00	191.20	578.80
Non-Plan	343.96	86.21	104.64	161.80	211.03	240.65	804.33
Total	664.73	161.81	194.64	259.80	335.03	431.85	1383.13

Source: Department of Agricultural Research and Education (DARE)

Table 2. Plan-wise share of horticulture (₹. Crore)

Plan Period	Agriculture & Allied Activities	Horticulture
IX Plan (1997-2002)	37546	1453(3.9)
X Plan (2002-2007)	58933	5025(8.5)
XI Plan (2007-2012)	136381	15800(11.6)
Annual Plan (2007-08)	17971	-
Annual Plan (2008-09)	27270	-
Annual Plan (2009-10)	28772	-
Annual Plan (2010-11)	36983	-
Annual Plan (2011-12)	46225	-
XII Plan (2012-2017)	363273	16840(4.6)
Annual Plan (2012-13)	54748	-
Annual Plan (2013-14)	NA	-

(Figures in parentheses are percentages)

Source: Agriculture &amp; Allied Activities: Agricultural Statistics at a Glance 2013, DES

Horticulture: National Horticulture Mission, DAC

The area under cut flower crops (with stems) used for bouquets, arrangements etc. has grown in recent years with growing affluence and people's interest in using flowers as gifts. The major flowers in this category are rose, gladiolus, tuberose, carnation, orchids and more recently lilioms, gerbera, chrysanthemum, gypsophila etc. Production of cut flowers increased to 78000 lakhs during 2013-14 from 66671 lakh during 2009-10. Among the major cut flowers, rose is the most popular in India followed by Gladiolus, gerbera, tuberose and orchid. More than two thirds of area is devoted for production of traditional flowers, which are marketed as loose flowers e.g. marigold, jasmine, chrysanthemum, aster, crossandra, tuberose etc. Loose flowers production in India has also increased many folds from 10.21 lakh MT in the year 2009-10 to 17.54 lakh MT during 2013-14. Area under floriculture expanded to 2.55 lakh ha during 2013-14 from 1.83 lakh ha during 2009-10 [8].

Andhra Pradesh, Karnataka and Tamil Nadu are the major flower growing states in the South, while it is West Bengal in the East, Maharashtra in the West and Rajasthan, Delhi and Haryana in the North. Among the states Andhra Pradesh leads in loose flowers production with 2,24,410 MT cultivated over 34,850 hectares, followed by Karnataka at 2,07,500 MT cultivated in 29,700 hectares and Tamil Nadu with 3,12,970 MT grown in 28,700 hectares. West Bengal has emerged as the largest producer in cut flowers with 25,429 lakh pieces, followed by Karnataka and Maharashtra. Other prominent cut flower producing states are Andhra Pradesh, Orissa, Uttar Pradesh, Assam, Uttarakhand, Himachal Pradesh and Jharkhand. About 4330 ha area is under rose cultivation, producing 874 million stems valued at ₹44.00 crores in the states of Tamil Nadu, Karnataka, Maharashtra and West Bengal. Tamil Nadu has the highest share of production of flowers (loose) during 2012-13 and in case of cut flowers; West Bengal has the highest share of 33.14%. The roses are cultivated both under green houses and open cultivation in Tamil Nadu in an area of 1949 ha. Of the total area Krishnagiri district is constituting more than 22 % of the State's area and largely cultivated in Hosur and Thenkanikottai followed by Dindigul (20%). Roses are cultivated to some extent in Salem, Dharmapuri and Thiruvallur districts together comprising 25% of the total area in the State (Table 3). According to studies, the rose cultivation is highly profitable earning an IRR of 21% [9].

Table 3. Area and production of roses in Tamil Nadu

District	Area(ha)	Area share (%)	Production (tonnes)
Coimbatore	22	1.13	160
Dharmapuri	121	6.21	877
Dindigul	399	20.47	2893
Erode	13	0.67	94
Krishnagiri	436	22.37	3161
Madurai	92	4.72	667
Salem	184	9.44	1334
Thiruchirapalli	40	2.05	290
Thirunelveli	32	1.64	232
Thiruvallur	146	7.49	1059
Tiruvannamalai	69	3.54	500
Vellore	79	4.05	573
State	1949	100.00	14130

Production of quality roses are important to win in the international market. Roses have various uses depending on the species and varieties. They may be used as garden plants and cut flowers. They can also be used in making rose water, rose oil and garland. Rose cut flowers have an important role in preparation of floral arrangements, bouquets, worship, presentation of gifts and social occasions. There are many varieties of the Indian roses cultivated throughout India which includes pink rose, white rose, maroon rose, red rose, yellow rose and orange rose. Commercial varieties of roses cultivated in India are furnished in Tables 4 and 5.

*Table 4. Rose varieties cultivated in India - Cut rose*

Type	Varieties
Floribunda rose	Kiss, Florence, Frisco, Mercedes and Jaguar
Hybrid tea rose	Melody, Darling, Sonia, Vivalid and Tineke
Spray rose	Nikita, Everlier, Joy, Baby Pink, Sofa and Lawrence
Bedding varieties	First Red and Merccedies
Exhibition varieties	First Red

*Table 5. Rose varieties cultivated in India – Garden rose*

Type	Varieties
Hybrid tea rose	Only love
Spray rose	Gladiator, YCD1, YCD2 and YCD3
Bedding varieties	Pusa Gaurav, Super Star, Red Montezum, Pusa Priya, Christian Dial, Oklalama, Happiness and Pusa Bahadur.
Exhibition varieties	Eiffel Tower, Pusa Sonia, Red Christien Dior, Mentezume and Superstar
Scented varieties	Crimson Glory, La France and Sugantha

Under the present IPR regime, commercialization of agricultural innovations requires FTO (Freedom to Operate). Freedom to Operate refers to the permissive use of technology and materials in the research, development and delivery of products and processes. Small and marginal farmers cultivating rose varieties in the Krishnagiri district of Tamil Nadu are sourcing the rose varieties from the Moerheim Roses and Trading India Pvt. Ltd and this company obtained trade mark for those rose varieties. The rose varieties with trade mark of the company are furnished in the Table 6. The company obtained trade mark for 50 rose varieties of various types.

*Table 6. Rose varieties of Moerheim Roses and Trading India Pvt. Ltd with trade mark*

Types of roses – cut flowers	Number of Varieties	Varieties with registered trade mark ®
Red Roses	9	Bordeaux, Devine, Lucky Star, Red Ribbo, Respect, Red Corvette, Myrna, Top Secret/ TajMahal and Tiamo
Yellow and Copper Roses	7	Charmant, Golden Gate, Intense, Peach Avelanche, Sirocco, Solaire and Svetlana
Light Pink Roses	6	Dekora, Nautica, La Belle, Sweet Avelanche, Pink Avelanche and Wham
Dark Pink Roses	8	Bonheur, Bugatti, Candy Avalanche, Hot Shot, Layla, Marina, Opus and Pink Bordeaux,
Orange Roses	5	Contrast, Corvette, Wow, Rock Star and TropicalAmazone
Bicolor roses	4	Blind Date, N-Ensemble, Royal Circus and Sovereign
White Roses	3	Avalanche, Blonde Beauty and Norma Jean
Spray Rose	8	Suntan, Ruby Star, Yellow Babe, Babe, Jelena, Fire Flash, Pink Flash and Snow Flake
Total	50	

#### 4.2. Export of Roses and Price realization

The country is bestowed with ideal temperature conditions for commercial floriculture throughout the year in some or other part. Knowing the growing potentials of this industry Indian provided the industries the 100% exported oriented status. During 2013-14 the total value of export of horticulture produce from India to different countries was ₹14365 crore. Export of flowers from India was about ₹456 crore. During 2014-15 India exported floriculture products worth of over ₹460 crore, and it is quite low in the global trade, which is nearly 2,72,000crore.

Availability of cheap and skilled manpower, conducive climate in many parts of the country proximity to market and advanced industrial base, as compared to other developing countries enable India to export roses to various countries as the demand for cut roses is growing at a compounded annual growth rate of 30 % per annum [10]. Subsidizing the rose growers by means of providing financial support to participate in the overseas exhibitions in order to find out new customers and providing financial aid for adoption of new technologies for improving the quality enables even the small cultivators to expand their markets in overseas. India export roses to more than 40 countries and India developed good will in each importing countries due to quality and timely supply as a result each importing country retains its share of imports from India. Thus, the promising supply of roses would enable the country to increase its export value consistently (Table 7). Value of export increased from ₹326 lakhs to ₹5615 lakh during the period between 2008-09 and 2015 -16.

Production and export data have also shown that the roses were marketed within India and exported only on special occasion like Christmas and valentine day during last few years, but demand expansion and government subsidies provided more opportunities for the small famers to export. Export of fresh cut roses and rose buds from the country dipped from 2,166 metric tonne in 2014-15 to 1,978 metric tonne in 2015-16. From a high of 16.5 million rose stems exported during February 2015, exports had dipped to 14 million flower stems during the same period last year. Despite such market eventualities, India continues to be one of the major exporters of roses due to its quality production with affordable cost.

*Table 7. Export market diversification for roses with HS code of 06031100*

Year	Number of export markets	Value of Export(₹ in Lakh)
2008-09	34	326.30
2009-10	39	1,658.62
2010-11	35	2,368.11
2011-12	42	2,179.22
2012-13	42	2,345.73
2013-14	45	3,817.31
2014-15	46	5,456.40
2015-16	39	5,614.87
2016-17	16	1,699.41
CV (%)	-	62.00

The variability in value of export during the said period is 62% and this variability is due to manifold increase in export value. Usually inconsistent supply in the export trade affects the credibility of the seller. Variability in quantity export is the prime concern for any exporting country and high variability leads to losing the export market as inconsistent supply compels the buyers to source from other exporting countries to meet the requirements of regular demand. The variability in quantity exported to various countries varied between less than 10% and more than 150% (Table 8). Quantity exported to 22 countries showed very high variability more than 100%. Quantity exported to 14 export destinations witnessed 80% variability and 11 destinations showed a variability of more than 100%. Rose exported to 17 markets also experienced the variability of 79% in terms of value. Variability in unit price realization is less than 50% in the majority of the markets.

*Table 8. Export market instability – quantity export*

CV (%) Range	Quantity Exported (Number of markets)	Average CV (%)	Value of Export (Number of markets)	Average CV (%)	Unit Price Realization (Number of markets)	Average CV (%)
10-30	2	5.90	1	27.9	13	24.51
30-50	2	45.05	3	42.47	18	42.74
50-70	9	60.42	6	63.08	12	58.63
70-90	14	79.63	17	79.01	4	83.70
90-110	4	93.78	7	100.56	3	100.93
110-130	11	113.93	9	119.3	2	111.40
130-150	8	139.89	5	138.66	-	
Above 150	3	168.37	5	177.81	1	195.9

Africa with its large rose farms even if a single farm falters on production; it tends to create a shortage in the export market. Among the African countries, Kenya is the world's largest exporter of roses. Rising cost of production in Kenya, flower Importers have been shifting their focus to India and Ethiopia [11]. With subsidy support to small growers, rose export has increased in the recent years as the small tea growers are able to expand their market in overseas. Indian roses which are normally marketed in the early years within in India and exported only on special occasions, like Christmas and Valentine's Day, now penetrated into wide number of markets abroad. European market is the main market for Indian roses. However, in the recent years Indian exporters are eying other markets like Australian and Asian countries due to high logistics cost and competition from East Africa.

Europe's, which is the highest importer of roses, preference towards Indian roses is increasing. Slowdown of local production in Europe during winter period is always leading to firmer demand for Indian roses. UK, which accounts for 35% of the India's rose exports followed by Japan (19%), Australia (18%) and Malaysia (Tables 9-10). The most favourable season for production of roses in India is from October to March, when prices in temperate/importer countries rule high while price of stem of even small flowered Kenyan roses varied from US\$ 0.21 to 0.30 and large flowered roses from Zimbabwe varied from US\$ 0.21 to 0.54. Incidentally, the sale of roses and their prices rule maximum in Europe on special days such as Valentine's Day (14th February) and Mother's Day in May.

Table 9. Potential export markets

Unit Price Realization (₹/kg)		Quantity Exported (000 kg)		Export value (₹.Lakh)	
Frequency	Number of markets	Frequency	Number of markets	Frequency	Number of markets
70 -100	4	Below 1	5	Below 1.00	2
101-150	3	1-10	19	1-10	16
151-200	10	10-20	6	10-20	6
201-250	13	20-30	3	20-30	3
251-300	7	30-40	1	30-40	2
301-350	6	40-50	1	40-50	1
351-400	3	50-60	3	50-60	-
400-450	2	60-70	2	60-70	2
451-500	2	70-80	-	70-80	-
501-550	1	80-90	1	80-90	3
551-600	1	90-100	1	90-100	1
-	-	Above 100	11	Above 100	17

Table 10. List of top ten potential export markets

Unit Price Realization		Quantity Exported		Export Value	
Country	Unit Value(₹/Kg)	Country	In 000 Kg	Country	₹ in Lakh
Thailand	590.16	U K	3287.30	U K	8681.43
Kazakhstan	530.59	Japan	2871.08	Japan	4225.63
Maldives	485.27	Australia	1177.63	Australia	3083.59
Canada	478.20	Malaysia	691.24	Malaysia	1703.18
Iraq	438.60	UAE	521.81	New Zealand	1553.09
Russia	435.82	Netherland	497.56	UAE	889.30
Ethiopia	392.83	New Zealand	427.55	Singapore	813.59
South Africa	392.13	Singapore	415.95	Lebanon	799.86
China	375.69	Lebanon	284.92	Netherland	677.57
Turkey	348.71	Saudi Arabia	215.88	Saudi Arabia	442.33

### 4.3. Impact of IPR

Predominant of small and marginal land holdings is considered to be a bottleneck for high technology adoption for higher productivity of Indian agriculture turn to be advantages for the small and marginal floriculture growers. Increasing domestic demand apart from export potential attracted many small and marginal farmers towards floriculture.

India's rose export is phenomenal in the recent years due technological and policy supports nevertheless the fact remains that there is inconsistent supply but India continues to supply roses to major markets consistently. As long as the payment of royalty would affect farmer's profit then it is expected that there would be loss in production and export earnings. When the rose cultivators realize a maximum export price of ₹6.47 per spike (Maximum price of ₹6.47 per spike was observed during 2006-17 in Lebanon), the net return is estimated at ₹0.53 (Tables 11 and 12). But the rose growers incurred a loss of ₹0.56 per spike if the price is plummeting to ₹2.64 per spike (Minimum price of ₹2.64 was noticed in Singapore during the same period). Estimated benefit-cost ratio is 1.52 for rose cultivators of Hosur Region during 2013 [12], while it is 1.29 for Satara district of Maharashtra during 2011 and 1.00 for West Bengal rose cultivators in the year 2012.

Table 11. Cost and Return in rose production

Particulars	Export	Domestic	Total
Yield (Lakh stems)	3.84	1.63	5.47
Price (₹/spike)	8.7	2.65	-
Gross Return (₹/Lakh)	33.41	4.32	33.73
Total Cost (₹/lakh)	-	-	24.74
Net Return		-	12.99

No doubt, rose cultivators are realizing higher benefits and my conservative estimates say that farmers gained ₹12.99 lakh per acre of land per annum with a benefit –cost ratio of 1.36 ultimately farmers are attracted to this lucrative business of production of roses. However, the rose growers of Kishnagiri district have to pay the royalty of 1.20 per spike exported then they have to incur loss. Under such circumstances, as pleaded by the farmers that only the small and marginal farmers should be exempted from paying such royalty. Does it feasible under the present IPR regime? Though India was exempted to avail certain benefits under WTO including the enacting its own IPR act under sui generis system to protect plants and conserve traditional germplasm, this type of demand would be possible under WIPO? Only alternative suggestions are gearing up the public R&D with professionalism to develop promising rose varieties suitable for export market with export quality traits and technology dissemination processes.

Table 12. Impact of IPR on profitability of rose cultivation

Particulars	Max	Min	Average
Price (₹/spike based on 60 spikes in a kg) - Average	5.05	2.87	3.96
Yield (Lakh stems/ac)	-	-	5.47
Cost per stem (₹)	-	-	4.52
Net Return per spike (₹)		-	(0.53 to -0.56)
Royal per spike (₹)	1.20	-	1.20
Cost per stem (₹)	-	-	5.72
Net Return per spike		-	Loss

Note: Maximum price of ₹6.47 per spike was observed during 2006-17 in Lebanon and minimum price of ₹2.64 per spike in Singapore during the same period

## 5. Conclusion

Increasing domestic demand coupled with export potential attracted many small and marginal farmers towards floriculture as result flower cultivation in India is mounting steadily. In order to cope with rising domestic and international demand, public investment on horticulture increased to 11.6 % cent during the XI plan period from 4% during the IX plan. However, it was only 4.6% during the XII plan period. On export front, Indian rose exports increased steadily as the demand for cut roses is growing at the rate of 30% per annum. Though rose export is phenomenal in the recent years due to technological and policy supports, the fact remains that there is inconsistent supply. But India continues to supply roses to major markets due to domestic profitability and quality of rose production. To continue to be the one of the major suppliers of roses in the international market, production of quality roses with higher returns are important. No doubt, rose cultivators are realizing higher benefits and my conservative estimates say that farmers gained ₹12.99 lakh per acre of land per annum with a benefit –cost ratio of 1.36 ultimately farmers are attracted to this lucrative business of production of roses.

As a result, Indian continues to export roses however; payment of ₹1.20 per spike exported may result in losing the export market because the farmers incur loss in rose cultivation. The question remains that whether the small and marginal farmers should be exempted from paying such royalty? Does it feasible under the present IPR regime? Though India was exempted to avail certain benefits under WTO including the enacting its own IPR act under sui generis system to protect plants and conserve traditional germplasm, this type of demand would be possible under WIPO? Only alternative suggestions are gearing up the public R&D with professionalism to develop promising rose varieties suitable for export market with export quality traits and technology dissemination processes.

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