The Fundamental Issue in the *Phalaenopsis* Industry in the Netherlands

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ABSTRACT *Phalaenopsis* is known as the top house plant sold in the world. In recent years, due to the decrease of price in the market, the recognition of the potted *Phalaenopsis* was changed from miracle crop to a thin or even no profit crops. More than half of the *Phalaenopsis* production is from the Netherlands, so the industry in this country was selected as a case study. As a main objective of this study, the fundamental issue in the *Phalaenopsis* industry of the Netherlands was investigated and reported. The demand and supply information were collected from literature and personal communication with orchids companies. With respect of this idea, the traditional and the new production schedule of *Phalaenopsis* potted plant were discussed. The change of sale prices were reported in monthly units. The uneven demand such as higher requirements during some festivals and very lower requirements in the summer was considered as the main reason for the dramatic change of sale prices. The estimated demand for *Phalaenopsis* potted plants in the market was also discussed. The major finding of this study indicated that the uneven requirement of flowers in the market and the constant supply of potted plants from flower companies were the essential problems for the *Phalaenopsis* industry. Therefore, this approach fails to achieve a balance between supply and demand. In order to operate sustainably an orchid production company, it was necessary to adjust the supply of *Phalaenopsis* potted plants for each week. The potential contribution of this finding was to propose the available methods to alleviate these problems. The available methods included to adjust the supply quantities of plantlets for plantlets nurseries and to modify their supply time to market with the environmental control and cultivation management by orchids companies. The experience of the development of *Phalaenopsis* industry was a lesson for the emerging flower industry.

Keywords: *Phalaenopsis*, the Netherlands, production process

I. Introduction

Phalaenopsis, due to its exotic, stylish, unique shapes and long-term durability, become the top house plant sold in the Netherlands. Thus, *Phalaenopsis* was recognized as the most produced and traded houseplant in The Netherlands and nearly 25% of the value of exported plants was realized by this product group. The Dutch *Phalaenopsis* cluster has experienced enormous growth since the year 2000. The production seemed to grow from around 8 million flowering *Phalaenopsis* plants in 2000 to approximately 150 million plants in 2015 [1]. Hence, the Dutch *Phalaenopsis* cluster was considered as the global market leader in terms of the production of *Phalaenopsis* plants [2]. The Netherlands is the worlds' biggest producers and exporters of *Phalaenopsis* and 90 % of the sold in Europe is from the Netherlands [1-3]. The *Phalaenopsis* industry in this country was selected as a case study.

It was known that 2003 to 2007 was the best period in Europe for the *Phalaenopsis* industry. The supply was increased enormously each year. However, the sale price was stabilized. The key point of this industry is believed to be the constant supply of Phalaenopsis potted plants through the years [3].

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The turnover was estimated was around 494 million EUR and the sold units was 137 million in 2016 [1]. It occupied more than 83% of all orchids cultivated in the Netherlander. Almost 90% of the *Phalaenopsis* sold in Europe was from this country [2].

The robust growth of the Dutch *Phalaenopsis* cluster was mainly caused by technical developments, the Dutch horticultural supply chain and the strong home-market. The meristem culture and cooling techniques augmented the accessibility of the product for consumers. Subsequently, growth was boosted by the presence of multiple sales possibilities and a large and strong home-market. Subsequently, a decreased growth in the Dutch home-market around 2010 resulted in intensified internationalization of the Dutch breeders and propagators. With the start of heavy competition with the overseas markets, this has increased the size of the Dutch *Phalaenopsis* cluster. Thus, this *Phalaenopsis* in the Netherlands industry was found to be under extreme pressure [3].

In order to help the growers to cultivate the orchid of good quality, some excellent culture guides have been published. Two nursery companies such as Anthura and Floriculture b.v. published their famous guides [4-6]. A significant reports was introduced by American Orchids Society [7-10]. Venamy Orchids supplied a detailed comprehensive guide in their web-site [11]. The study of the physiology of *Phalaenopsis* and practical culture techniques were reported in various scientific journals [12-16].

However, not too much of the reports concerned of the *Phalaenopsis* industry. Griesbach [7] proposed that the *Phalaenopsis* orchids would be promoted as an industry and shared on international market. Hsiao et al. [18] has suggested to promote a country brand label for the orchids products in the international markets. Krause et al. [19] has identified the value chain of potted *Phalaenopsis* for two countries, i.e., Germany and the Netherlands and proposed the importance of the business-to-business quality management systems in this value chain. Grosscurt [20] studied the topic of the rise of the Dutch *Phalaenopsis* cluster and found that the important factors such as the business environment, cluster size, knowledge and innovation and the marketing & strategy could play a crucial role on the global market leadership of the *Phalaenopsis* clusters were.

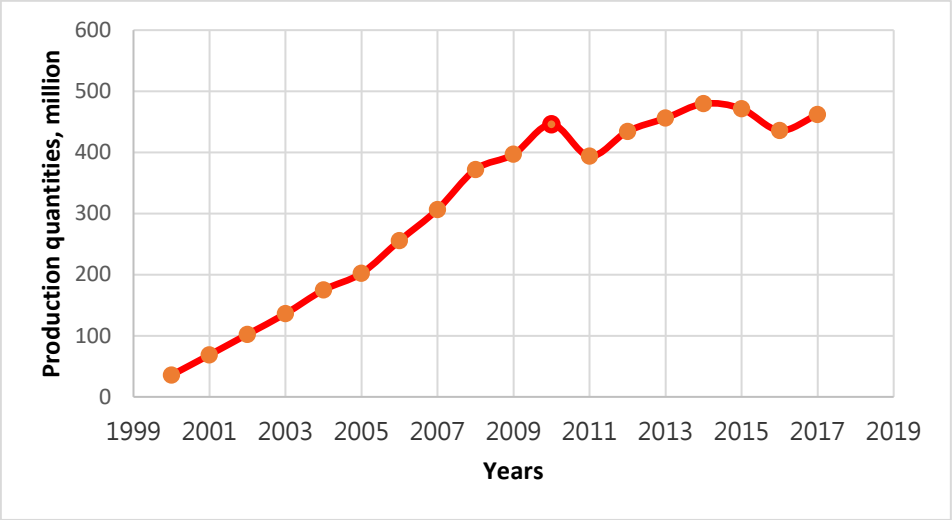
The Dutch potted Phalaenopsis market is presented in Figure 1. In 2000, only 8 million plants were produced. The maximum production was estimated 121 million in 2014. The trend of turnover was quite similar to the quantities is shown in Figure 1.

The change of the average sale price is shown in Figure 2. Previous to 2009, the average sale price was found to be higher than 4.0 EUR (Europe dollar) and the production cost per unit was found to be lower than 4.0 EUR for 10 years [21-24]. It was stated that with the increase of supply, the sale price was still remained stable. That was the reason that the orchid was called as the miracle crops. Actually, the lowest price was observed in 2009 and this price never increased more than 4.0 EUR since 2009 [23-26].

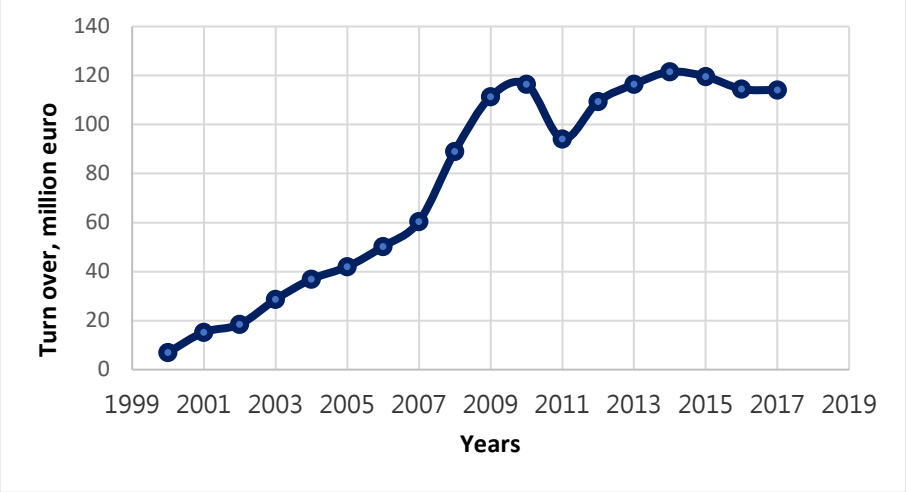
In recent years, the Phalaenopsis industry in the Netherlands encountered serious problems and the sale price was decreased continuously. With the report of Dutch Phalaenopsis industry under extreme pressure [3], author interviewed many nurseries and orchids companies in this orchids industry. They found that growers would to rent their space to other industries or they no longer wanted to fill the space of the greenhouse. The observed general trend was to sell this potted orchids at cost price plus. For example, 75% of the 12-cm pot Phalaenopsis with at 12 flowers were sold for 3 EUR or more in 2017. However, in 2018, the price was only maintained between 50-60 %. The estimated average auction price of Phalaenopsis products from week 1 to week 24 was 2.9 EUR that was 0.8 EUR was found to be lower than that in 2017. The price that sold by auction and intermediate services during the

same period was 3.58 EUR, which was 0.4 EUR less than that in 2017 [26].

Thus, there arose a question such as why the recognized about the potted *Phalaenopsis* was changed from miracle crop to a thin or no profit crops [23-26]? What was the fundamental issue in the *Phalaenopsis* industry of the Netherlands [27-30]? The methodology of this study was to collect the related information from literature, especially from the reports of auction markets. The quantities of production and turn over were analyzed. The flow chart of production was introduced. Then the practical method to alleviate these problems was proposed. In this study, the article was organized different sections as follows; section 2 presented the traditional process of *Phalaenopsis* potted plant production and the new production schedule. Section 3 presented the change of sale prices investigated in monthly units. Section 4 presents the market's estimated demand for potted plants of *Phalaenopsis*. Section 5 proposed the fundamental problems and suggestions in the *Phalaenopsis* industry for the Netherlands. The final conclusion was discussed in section 6.



a. Production quantities



b. Turnover

Fig. 1 The trends of the turnover and quantities of the potted *Phalaenopsis* in the market of the Netherlands. Data sources are Knijff and Splinter [21], Middelkoop [22,24,26] and FloraHolland [25]

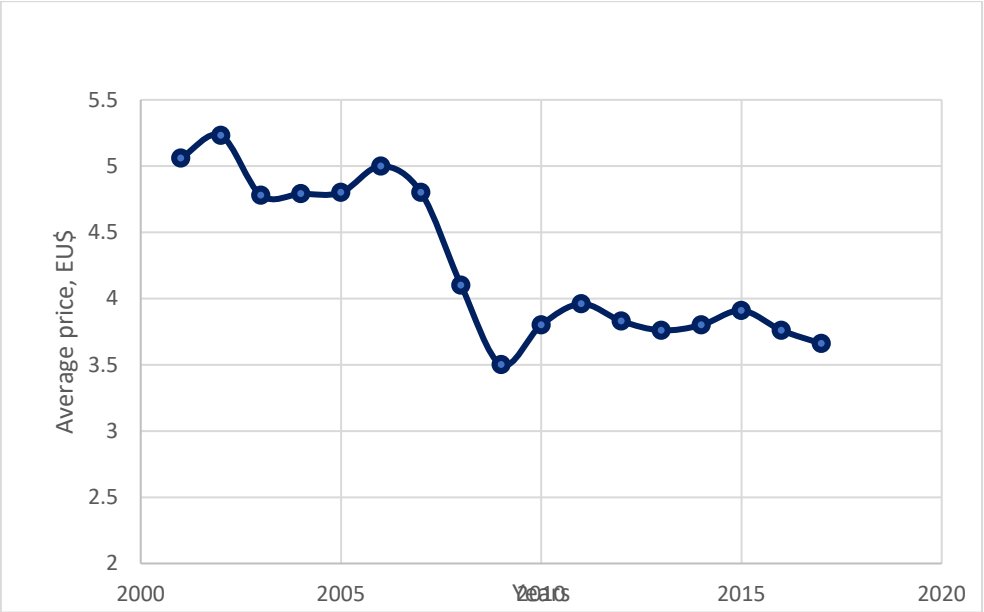


Fig. 2 The change of the average price of the potted *Phalaenopsis* in the market of the Netherlands. Data source are Knijff and Splinter [21], Middelkoop [22,24,26] and FloraHolland [25]

II. The Process of *Phalaenopsis* Potted Plant Production

The flow chart of traditional *Phalaenopsis* production is shown in Figure 3. Breeding, selection and production of seedlings were carried out in nurseries such as Floricultural and Anthura.

Once young plants reached the desired size (usually determined by leaf width and culture period), they are transported to production companies such as Opti-Flor and Ter Laak, where the seedlings are transplanted into 12 cm pots and sent to the vegetative greenhouse.

In this growing greenhouse, typical day and night temperatures are maintained at 28 ° C and 26 ° C, respectively. Once these plants reach maturity, they are moved to the cooling room for spiking. The environment was maintained at 20 ° C and 18 ° C during the day and night, respectively. [4-6].

The required time period (in weeks) for the *Phalaenopsis* potted plants is shown in Figure 2. In nurseries, it usually takes 2 years or more to produce tissue culture plantlets from the mother plants. These plantlets are removed from the culture vessels and transplanted into a soft tray or plug. After 26 weeks of cultivation, the plantlets were planted as seedlings and then delivered to the production company. In the production company, it takes half a year (26 weeks) to grow the mature plants and finally treated the plants by cooling. The *Phalaenopsis* potted plants are then shipped directly to the auction market or to the customer [4-6].

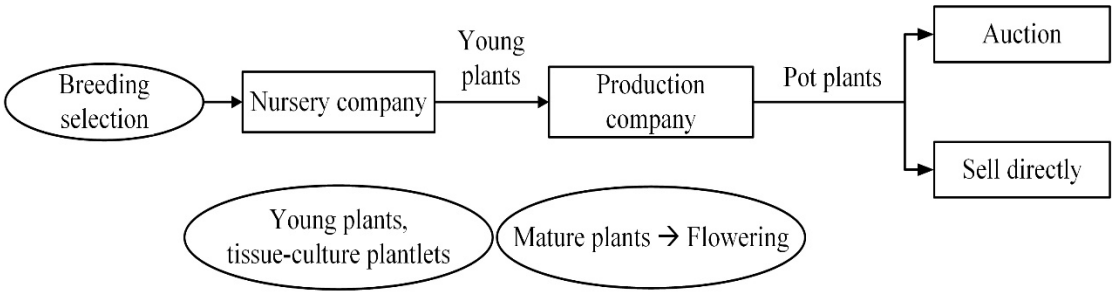


Fig. 3 Flow chart of the traditional production and sale of *Phalaenopsis* in the Netherlands

The flow chart in Figure 4 shows the perfect production plan. Production companies regularly receive the young plants from nurseries in regular schedules. Every week or every two weeks, they receive a certain number of young plants and are ready to produce. After 46 weeks or more, the flower products of these plants are sold and the production period is determined [4-6, 15-16].

Due to the regular production plan, the space utilization of the greenhouses used for production is indeed very easy to plan. The first phase of the vegetative phase used nearly 30% of the area; 15% for the second vegetative phase; 17% for the spiking; and the last 38% for the flowering [5-6]. The labor required was fixed and it is easy to manage at these different stages.

Since the production company receives young plants at a fixed time, the nursery can easily arrange their production plans. They can produce the same number of young plants per week because they can prepare the same amount of the same number of plant tissue plantlets per week. In other words, a sterile laminar flow cabinet can be operated every working day and it is often easy to prepare the required amount of operator and tissue culture material.

Therefore, the key to the success of the *Phalaenopsis* industry is that the nursery supplies a fixed number of plantlets. Production companies can receive similar amounts of plantlets and sell them after a fixed culture period. In the auction market, the same number of *Phalaenopsis* potted plants are sent every working day and a similar number of products are sold on the market. In the first stage of 2003-2007, each sector of this *Phalaenopsis* industry worked well and smoothly.

In the beginning of the diversity of the *Phalaenopsis* potted plants market, different pot sizes were accepted in the market since 2010. The production schedule for four pot sizes are shown in Figure 5. For example, 6 cm potted *Phalaenopsis* only required 35-40 weeks from the tissue-culture plantlets to reach the mature stages and spent 6-10 weeks for spiking and flowering as shown in Figure 5. After finishing the young plant stage, 9 cm potted flowers took 9-14 weeks to reach the matured stages. For various pot sizes, the required cultivation times are different and the spaces required for different pots sizes are different from each other. Changes in production schedules not only affect the production period, the amount of greenhouse space and labor required, but also the delivery time and quantity of young plants for the nursery.

III. The change of sale price investigated in monthly units

The quantity of *Phalaenopsis* potted plants showed problem of over-supply since 2008 and the supply was not constant during each month in the auction market. The sales quantities of *Phalaenopsis* in a typical auction market for 2008 and 2010 are shown in Figure 6. In some months, the supply quantity was found to be higher.

The sales price of *Phalaenopsis* in the auction market for 3 years (2008-2010) is shown in Figure 7. According to Figure 7, prices in February, May and November seem to be higher, and prices in summer are the lowest.

A similar trend in data was discovered in 2014, as shown in Figure 8. There are three sizes of flower pots in the flower market. The price distribution of the three pots is very similar. It is estimated that prices are higher in February, March, May, November and December, and lowest in summer.

The similar trends were found in recent years [22,24,26]. In spite of selling the different sizes of potted *Phalaenopsis* were sold in the market, the trends of sale prices were similar as estimated in 2008 – 2010.

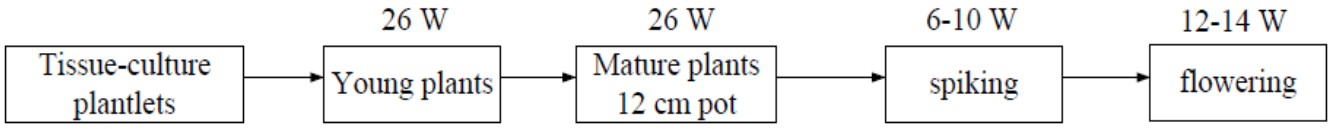


Fig. 4 The required periods (in weeks) for the potted *Phalaenopsis* in the Netherlands

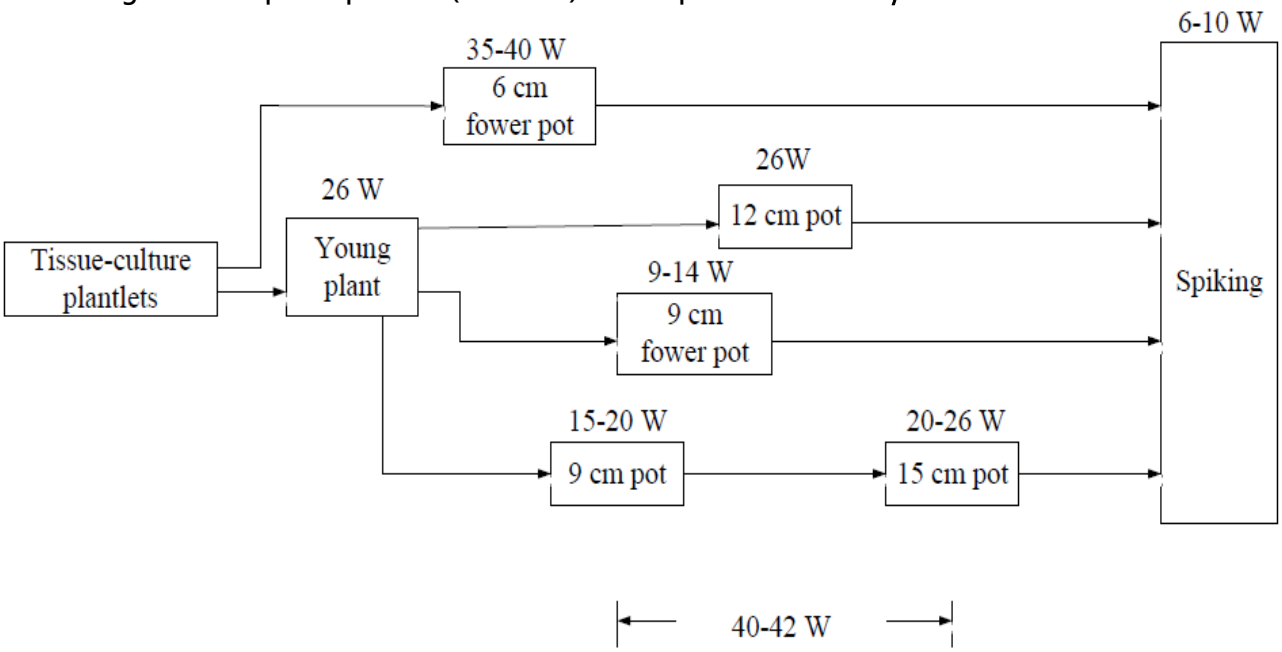


Fig. 5 The new production schedule for the potted *Phalaenopsis* in the Netherlands

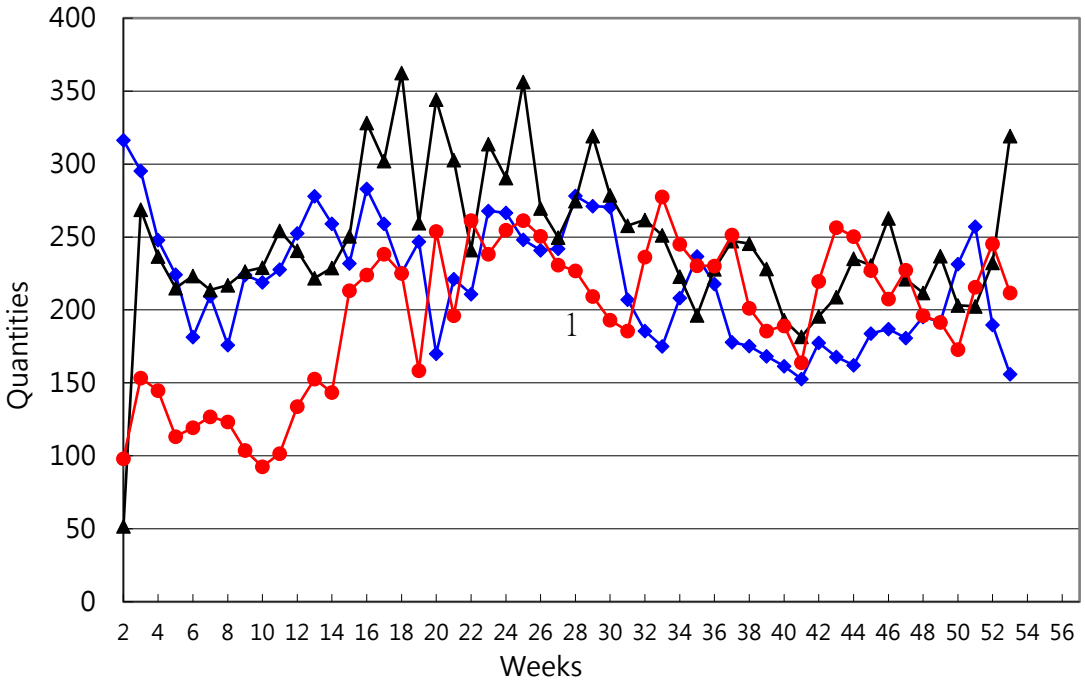


Fig. 6 The sales quantities of *Phalaenopsis* in a typical auction market

●Red:2008, ▲Black, 2009, ◆ blue, 2010.

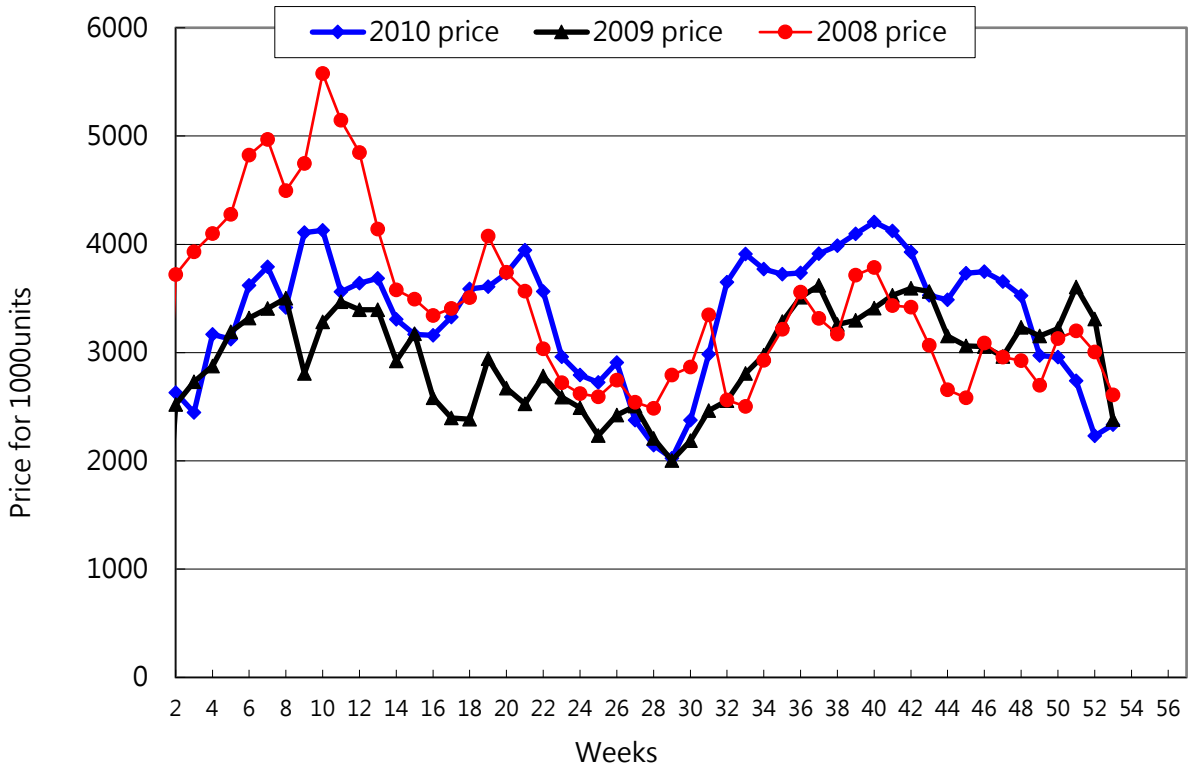


Fig. 7 The sale prices of *Phalaenopsis* in a typical auction market

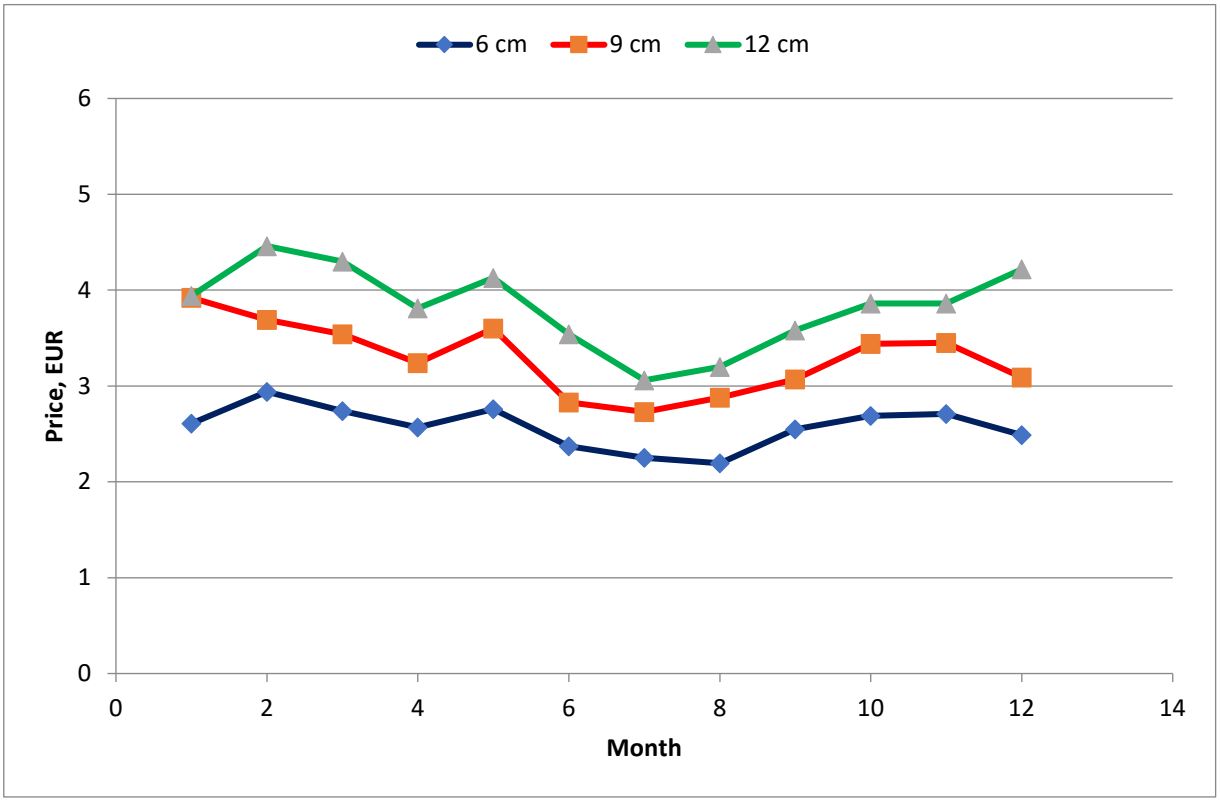


Fig. 8 Sale price of three pot sizes of *Phalaenopsis* in 2014. The data source is from Mr. Ivo Biemond, Symphony of orchids [30]

IV. The estimated demand for *Phalaenopsis* potted plants in the market

The estimated trends of the demand are shown in Figure 9. It could be stated that the law of demand and supply is the basic principle for the flower market. The quantities of demand were the estimated values from the information of some typical auction markets [22-26] and orchid companies [3,26].

Three types of demands estimated were as follows:

(1) Small demand: June, July, August and the first 2 weeks of September

(2) Moderate demands: January, March, and October

(3) High demand: February, May, the last 2 weeks of September, November, and December.

The *Phalaenopsis* production was affected by the supply of potted plants in production companies. The estimated demand for *Phalaenopsis* in one auction market of The Netherlands is shown in Figure 9. Based on the data, the obtained information were as follows:

(1) If the total supply quantity was 600,000 units (in Figure 9), the supply of each week was found to be lower than that of the demand, and the orchid price was high. That was true in the era of 2003-2007 and the average price of this year was higher than the production cost.

(2). If the total quantity was 1,000,000 units (in Figure 7), orchid company gained benefit in some months and loss in other months. As the gain was apparently larger than the loss, it could be known that they obtained the positive net income. The average price of this year was found to approach the production cost.

(3). If the total supply quantity was too high (1,400,000 units in Figure 7), orchid companies obtained a benefit only in some months. Most of the year, they received a negative net income, that is the total income was found to be negative. The average price of this year was found to be lower than the production cost.

In order to sustainably operate an orchid production company, the total supply of seasonal or monthly *Phalaenopsis* potted plants should be adjusted. In fact, in order to get more benefits, the basic possibility is to reduce the production cost by increasing the planting area of the orchid company. Therefore, some companies with smaller greenhouses will be forced to close the industry. For example, at least 10 companies are expected to exit the industry in 2019 [3].

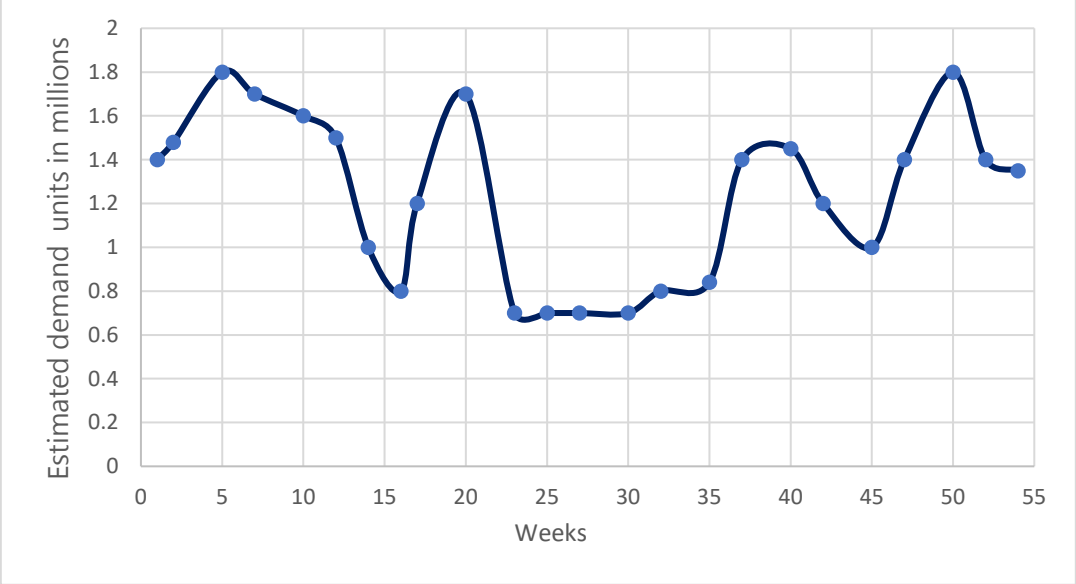


Fig. 9 Estimated demand of *Phalaenopsis* in The Netherlands. The quantities of demand were the estimated values from the information of some typical auction markets [22-26] and orchid companies [3,26]

V. Discussion

The fundamental problems and suggestion for the *Phalaenopsis* industry were discussed in the following.

Besides reducing the production costs by increasing greenhouse area, the other way was possibly to adjust the supply of *Phalaenopsis* potted plants in each week or each month, that is, the orchid companies could increase the supply in higher-demand months such as in February, March and May and reduce the supply in the hot season. In this way, the supply and demand could be balanced. The supply of *Phalaenopsis* potted plants was found not to be constant throughout the year. There would be higher requirements during some important holidays and pretty lower requirements in the summer.

Taking together all into consideration, it could be noted if production companies adopted, this new production schedule, there was a need to rearrange the space utilization of their greenhouse needs to be rearranged. The labor requirement should also be modified. The most important change in the production schedule was fund to be the supply time and quantity of young plants. Since the young plants were delivered, they were not cultured in the same schedule and not sold into same quantity. The orchid production companies were willing want to order more young plants in high-demand months and only fewer quantities in summer.

As the production companies could change their production plan, a serious problem would occur in the nurseries. The nursery was expected to deliver a high quantity of young plants in high-demand months and less quantity during some weeks. So there was a need to modify the production plan. The laboratories required to produce more tissue-culture plantlets in some months and reduce the production in other months. They could not produce the same quantity of plantlets for each day or each week. Under this condition, all sterile laminar-flow cabinets could not be operated all around the year. This uneven production schedule thus caused management problem in the laboratory. This was the fundamental problem for the *Phalaenopsis* industry in Europe.

In order to alleviate this uneven production, some methods were suggested as follows:

The manufacturing of tissue-culture plantlets in other countries could be the one possible way. However, overseas laboratories could also face same problems of uneven production if their production scale was expanded.

The other methods suggested to the growers to adjust their supply time to market were the environmental and management. For example, regularizing the setting values of day, night temperature & light intensity and adjusting the concentrations and ratio of the nitrogen-phosphorus-potassium. However, the quantities of regular supply were limited by these methods.

The existing uneven requirement of flowers in the market and the constant supply of potted plants as the essential problems for the *Phalaenopsis* industry could not make the balance of demand and supply. Hence, it was required to balance the supply and demand. However, as the problems for nurseries and production companies, the uneven supply to market could induce an uneven production of young plants and tissue-culture plantlets. If these essential problems could not be solved, the quantities of the *Phalaenopsis* sold in markets would be confined in the limited quantities nowadays. The developing process of the *Phalaenopsis* industry was a lesson for the emerging flower industry.

VI. Conclusion

Recently, recognition about the potted *Phalaenopsis* was changed from miracle crop to a thin or no profit crops. Hence, there was a need to study the fundamental issue in the *Phalaenopsis* industry of the Netherlands need to be studied. As the main idea of this study, the traditional process

production and the new production schedule of *Phalaenopsis* potted plant were introduced. The change of sale prices were investigated in monthly units and the estimated demand for *Phalaenopsis* potted plants in the market was exampled. The uneven requirement of flowers in the market and the constant supply of potted plants were found as the essential problems for the *Phalaenopsis* industry. It was also observed that the balance of demand and supply could not be made easily. So the supply of *Phalaenopsis* potted plants for each week or each month should to be adjusted in order to operate sustainably an orchid production company. In order to overcome the drawbacks, the methods suggested were to adjust the supply quantities of plantlets for plantlets nurseries and modified their supply time to market with the environmental control and cultivation management.

The limitation of this research was the lack of the interviews of individual orchid company and members of the orchid clusters. So the content of this paper was a brief report in this journal. More detail research should be performed about this subject. The content of this paper could provide some ideals of this *Phalaenopsis* industry.

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