

*Full Length Research Paper*

# Consumer attitudes for new plant species using the example of *Trachycarpus wagnerianus*

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**This article reviews the purchase behaviour of consumers for plants and the attitude towards horticultural novelties. The palm, *Trachycarpus wagnerianus* especially, is the main focus of this study. Based on a survey of 408 customers in Bavaria during autumn 2009, the results gave an impression of how consumers inform themselves about novelties in horticulture as well as, their attitude to *T. wagnerianus*. Within the standardized questionnaire, a conjoint measurement was applied in order to investigate the impact of the different characteristics of the palm on consumers' choice. Drawing all factors of the conjoint measurement into consideration, the *T. wagnerianus* has slight advantages when compared to the common *Trachycarpus fortunei*.**

**Key words:** Conjoint analysis, consumer research, palms, purchasing behaviour.

## INTRODUCTION

The horticultural market in Germany represents the biggest market in Europe with revenues of around 9.5 billion € for flowers and plants in 2009 (Lerch, 2009). Especially the sales of indoor and outdoor plants increased between the years 2004 to 2009. Indoor plants had a market share of 52.3% in 2008 and outdoor plants represent a share of 28.9% (Lerch, 2009). One of the reasons for growing sales of horticultural plants is the fact that gardening has become trendier in Germany during the previous years (Lerch, 2009). Many people enjoy their terrace and garden as a comfortable enlargement of their house which is regarded as a kind of living room in the fresh air (Lerch, 2009). The garden turns out to be a place for recreation as well as, a social meeting point. The number of gardens, terraces and balconies is still increasing in Germany, which is an important factor for potential future growth especially, for sales of outdoor plants (Lerch, 2009). Within the outdoor segment, palms for garden use are one of the horticultural plants that capture the Mediterranean trend. *Trachycarpus* species especially, have been imported in increasing numbers mostly from China in recent years (Schrage, 2008). They

are not just used as pot plants, but a number of palms have been planted in the open ground even in Germany. Not just in botanical gardens but also in increasing numbers in private gardens, although, they must be protected against low temperatures in most regions of Germany during winter (Doerken and Steinecke, 2009). Palms mostly planted in the open ground in Netherlands are *Trachycarpus fortunei* and *Chamaerops humilis* (Bennink, 2009). Up till now, this market trend towards palms is mostly captured by online shops which offer a large variety of so-called cold hardy palms. For example, Google offers a number of 29,500 hits of German internet sites to this topic. Meanwhile, a few specialized wholesalers for palms and other exotic plants entered the market as well (Fuchs, 2009). In addition to the rather widely spread *T. Fortunei*, another form of *Trachycarpus* is on its way into the German market: *Trachycarpus wagnerianus*. In plant systematic, it was announced by Govaerts and Dransfield (2005) that *T. wagnerianus* is not an owned species but a synonym of *T. fortunei*. Nevertheless, the name *T. wagnerianus* is still used to show the difference to the common *T. fortunei*. *T. wagnerianus* is supposed to be more suitable for Central European climate conditions. Its advantages are a smaller, stronger leaf with a short leafshaft which leads to a higher wind resistance and a more compact habitus (Bennink, 2009). But still, *T. wagnerianus* is rather

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unknown among the consumers in Germany. Within a students' project at the University of Applied Sciences Weihenstephan-Triesdorf, the purchase behaviour with respect to horticultural novelties and especially, *T. wagnerianus* was investigated in a consumer survey in 2009. To date, only a few published studies are available in this field. For example, Berghage and Wolnick (2000) made a survey on consumers' preferences for flower and leaf colour of new *Guinea Impatiens* during a garden festival in Pennsylvania where the participants of this survey showed a preference for bright solid colours (in particular, red or red-violet) and bicolour flowers. In addition, the age of the respondent was correlated to the probability of purchasing new *G. Impatiens*, with customers aged above 40 years being more likely to purchase such plants (Berghage and Wolnick, 2000). Posadas et al. (2006) analyzed the levels of liking and willingness to pay for selected garden Chrysanthemum in Mississippi in 2003. For that purpose, nine Chrysanthemum were presented to 579 survey participants in three different pot sizes. The level of liking of the nine cultivars was estimated by using the ordered Logit method, while the willingness to pay model for the nine cultivars was analyzed by using Tobit method (Aldrich and Nelson, 1984). Respondents preferred 5 specific cultivars with female respondents being willing to pay more for the cultivars. In addition, respondents who previously bought chrysanthemum reported higher likings for the cultivars but they were not willing to pay more for them. With respect to socio-demographic attributes of the respondents, age and household size, the pot size of the cultivars had a negative effect on the respondents' willingness to pay for the cultivars (Posadas et al., 2006).

Hudson and Griffin (2004) examined consumer willingness to pay for cut flower product attributes using a choice-based experiment through mail survey. This study showed that consumers preferred mixed colour arrangements (compared to single colour arrangements) and that they were willing to pay a price premium for cut flower products that were guaranteed as produced in the local area (that is, in this case, the state of Mississippi). In their study in Taiwan, Huang and Yeh (2009) concluded that "curiosity fulfilment" is a major factor for the purchase of flowers. The term "curiosity fulfilment" includes a strong consumers' preference for novelties in flowers (Huang and Yeh, 2009). Altogether, there is a lack of studies in scientific literature which capture consumer behaviour and willingness to pay for new outdoor plants. Thus, this study was initiated in order to analyze these aspects with respect to *T. wagnerianus*.

## METHODOLOGY

A standardized questionnaire was developed for the consumer survey which consists of four major parts such as:

1. Purchase behaviour for horticultural products in general
2. Attitude towards novelties in horticultural products

3. Attitude towards palms and the new *T. wagnerianus*
4. Socio-demographic data

In scientific literature, conjoint measurement is regarded as a suitable tool for measuring the different attributes and their influence on the consumers' preferences. It is also used to implement market segmentation and product positioning (Green and Krieger, 1991). One requirement for a conjoint analysis is to have a product which consists of several different characteristics (Albers et al., 2009). The global aim of conjoint measurement is to investigate part-worth functions for the attributes of a good in doing evaluation on the consumers' preferences (Green and Srinivasan, 1978). The part-worth functions are measured on the individual level in a traditional conjoint analysis (Green and Krieger, 1991). As a result, preference heterogeneity among consumers, if present, can be found when using this method (Green and Krieger, 1991). But not only are the part-worth functions of the individual consumers also important. Even more, the total consumer benefit is the objective to the researcher (Backhaus et al., 2006). The consumer preferences analyzed in a conjoint measurement are a substantial information base for the pricing and product policy when marketing a new product (Albers et al., 2009). A traditional conjoint analysis was done in our study as one option of the decompositional methods. In case there are just two parameter values of the goods' characteristics, the so-called Trade-off method is used within a conjoint experiment. If there are more parameter values of interest in the product to be analyzed, the Full-Profile method is the first choice for collecting the required information in the conjoint experiment. Thus, we used the latter method for our study. In horticulture, there are very few studies that dealt with conjoint analysis in order to gain knowledge about consumer preferences. For example, a conjoint measurement was used to investigate consumer preferences for geraniums (Behe et al., 1999), residential landscapes or Tabletop Christmas trees (Behe et al., 2005a, b). Also for roses (Prince et al., 1980) and for rhododendrons (Gineo, 1990), this method was applied.

Backhaus et al. (2006) suggested five steps for a conjoint measurement. In the first step, certain characteristics of the good must be chosen and the data collection design must be developed in the next step. After that, data collection is realized within a survey in which consumer preferences of the fictive products are measured. Then, the individual part-worth functions are statistically estimated from this data pool. In the last step, the part-worth functions of the individual respondents are aggregated if necessary. Backhaus et al. (2006) further suggested using a low number of product characteristics in the conjoint experiment. In our study, four characteristics of *T. wagnerianus* had to be measured which had different parameter values. "Cold hardiness" of this palm was divided into "possible", "possible with protection" and "impossible". "Leave withstand against wind" had the values "low" and "high" and the "price levels" were set to 129, 159, and € 189 respectively. The characteristic "plant habitus" had the parameter values "compact" and "wide". With the help of these characteristics, a differentiation to the *T. fortunei* could be made. Therefore, these parameters were chosen for the conjoint measurement. After collecting the required data, conjoint analysis defines the overall consumer preference for a particular product, in this case, the palm *T. wagnerianus*, as the sum of the part-worth for each parameter value. Backhaus et al. (2006) suggested that there should be less than 20 fictive products (stimuli) in a full study. As we would have had  $2 \times 2 \times 3 \times 3 = 36$  stimuli in our study, it was reduced to 11 fictive products with the help of the software SPSS version 17 (Statistical Package for the Social Science). For the fictive products, 11 coloured photographs were used showing either a *T. wagnerianus* or *T. fortunei*. With the help of these pictures that were integrated in the questionnaire, the surveyed people were asked to build a rank order from 1 to 11 whereas, number one would be their first choice of buying. Card numbers 1 to 9 are those cards that are being tested. Card numbers

10 and 11 are so-called hold-out cards. They are in the experiment designed to check the validity of the statistical results of the experiment and therefore, are not used to estimate the part worth functions.

The questionnaire was spread out by students of our university. Berekhoven et al. (2006) postulates to have a strong focus on the universe as the asked people can have a major impact on the results. In contrary to other branches, it is quite hard to identify the universe of people who are interested in plants and gardening and in particular, to those people who are potentially interested in new varieties of palms. So, the students manually handed out the questionnaires in different parts all over Bavaria and distributed them mostly to homes with garden whose inhabitants were supposed to have a bigger affinity to gardening than others. Altogether, a total number of 2,000 questionnaires were spread out which represents 0.37% of the 538,000 garden owners in the federal state of Bavaria, Germany (Beiersdorf, 2009) at the end of October 2009. Most of the questionnaires were spread out in the area around Freising and Munich and a few were distributed in the Northern part of Bavaria with a focus on the city of Nuremberg.

## RESULTS AND DISCUSSION

### General characteristics of the sample

408 usable filled-in questionnaires were sent back which equals to a response rate of 20.4%. A majority of 69.9% of the respondents were females and between forty-one and sixty years of age (53.4%). The majority of female buyers of horticultural products which was found in our survey is supported by a series of studies in different countries (Yue and Behe, 2008; Schmahl, 2008; Posadas et al., 2006; Menrad and Hardung, 2006; Menrad and Fink, 2005; Batt and Pool, 2004; Mortelmans and Damen, 2001; Behe and Wolnick, 1991a, b). The same relates to the majority of buyers of horticultural products aged 50 years or more in Germany (Menrad and Fink, 2005; Fink, 2004). More than three-quarter (75.5 %) of the surveyed people live in their own homes and 86.7% have a garden. This means that people who live in rented homes have access to a garden. 40.2% of the participants had a monthly net income of more than € 3,000 per household and 57% stated at least a university entrance allowance. Compared to the entire Bavarian population where the average net income per household is € 3.172 (Albers et al., 2009), our sample is representative in this point. However, the level of education is above average. In Germany, only 24% had university entrance allowance (Aldrich and Nelson, 1984). The respondents either live mostly in small villages below 5,000 inhabitants (35.9%) or in cities from 100,000 up to 1 million inhabitants (43.8%). 36 people (9.1%) live in a town from 5,000 up to 10,000 inhabitants and 11.1% or 44 people live in large cities with a population of more than 1 million people.

### Purchase behaviour for horticultural products

29.4% of our respondents buy horticultural products at

least monthly in a nursery which makes this outlet the most popular distribution channel for horticultural products. Garden centres are frequented at least monthly by 14.1%, grocery stores by 17.5%, DIY-stores by 14% of the people. In contrary, tree nurseries are rarely or never frequented by 79.7% of the people as well as, Online Shops in which 93% of the surveyed people rarely or never buy horticultural products. According to Lerch (2009), the most important outlets for plants are still traditional nurseries and florist shops with a market share of 29.3% which is congruent to our results. 33.5% of the respondents of our survey spend between € 100 and € 199 per year for plants and flowers and just 10.7% spend below € 50 per year. 34.5% of the surveyed people spend above € 200 per year. The average spending on flowers and plants in Germany was € 116 per capita in 2008 (Lerch, 2009).

As shown in Figure 1, the price-benefit-ratio, high quality plants and well-to-understand plant care instructions are the most important purchasing criteria for our respondents. But also, expert advice is at least an important factor for 72.1% of the surveyed people. Other studies also indicated the high relevance of good plant quality and the personal advice as important purchase criteria for horticultural products in Germany (Schmahl, 2008; Elgner, 2008; Kitemann, 2007; Menrad and Fink, 2005; Rothenburger et al., 1996). Concerning garden design, 74.4% of the surveyed people like to set their own course. Just 6.2% of the respondents prefer exotic and extraordinary plants which are not often used so far. A garden that is close to nature is preferred by 64.1% of the sample's respondents.

### Information seeking behaviour for horticultural novelties

17.6% of the respondents inform themselves regularly about horticultural novelties but the big majority of 62% only does this from time to time. 20.1% have no interest in new plants. Basic information about plants is gathered personally while shopping (56.1%) followed by specific gardening magazines (26.2%), TV (24.5%) and specific books (17.6%). Postage mailings (10.3%) and E-mail Newsletters (2.2%) have limited relevance for gathering information. 41% of the surveyed people read a gardening magazine sometimes and 13.3% read such a magazine regularly. From the regular readers of gardening magazines, 47.2% inform themselves regularly about horticultural novelties while 50.9% of the regular readers are interested in new plant products only partially. However, the regular readers of gardening magazines spend significantly more money on plants. 47.1% of the people who read gardening magazines regularly spend annually € 200 or more on plants. From the people who never read a magazine (45.6% of all respondents) just 26.3% spend 200 € or more per year

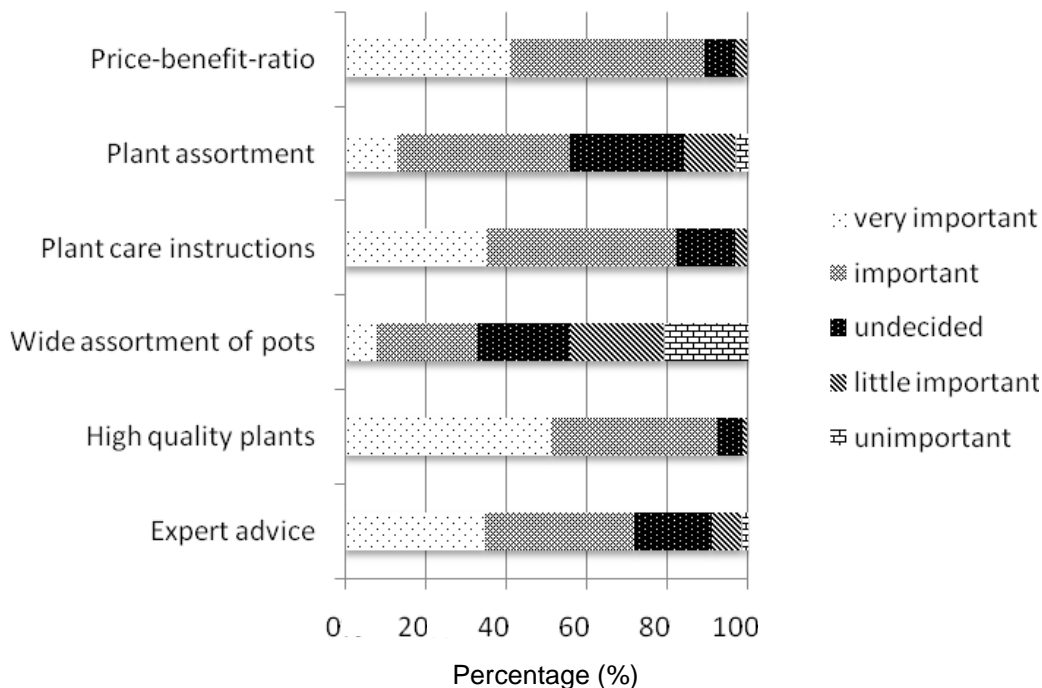


Figure 1. Criteria for plant purchase (n = 408).

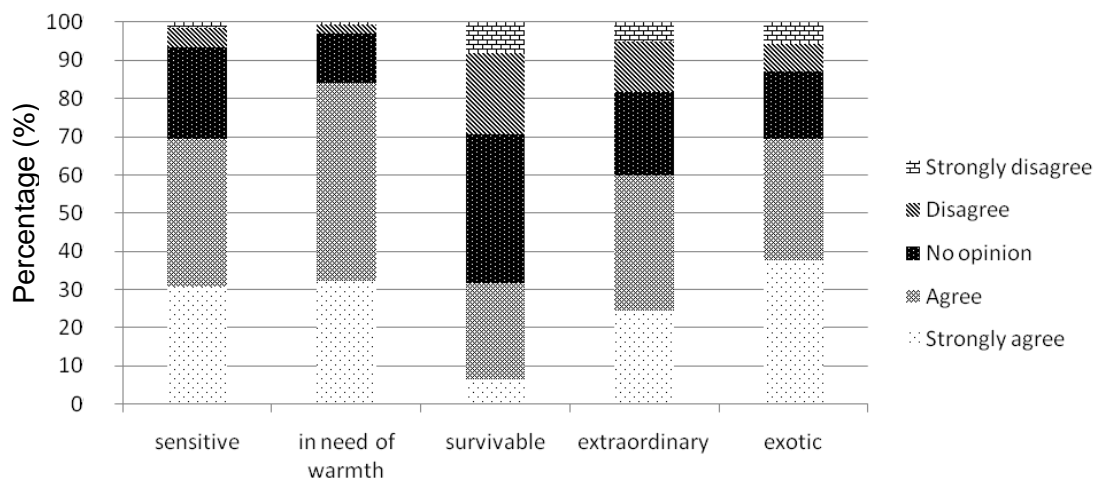


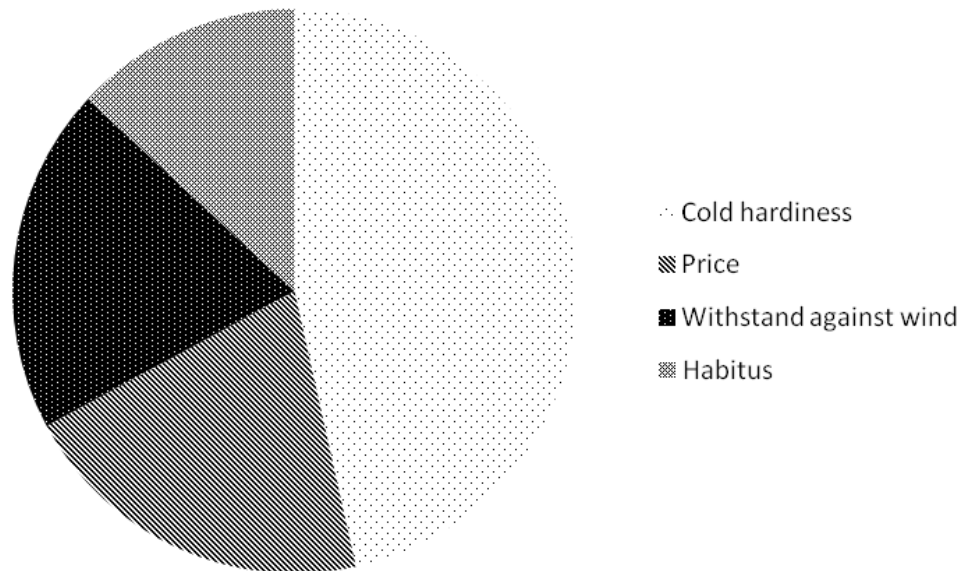
Figure 2. Consumers' opinion about palms in gardens (n = 408).

on plants. 52.9% of all respondents of our survey sometimes watch a TV show about gardening, 10.4% regularly and 36.7% never watch such a show.

**Attitudes and buying behaviour towards garden palms and the palm *Trachycarpus wagnerianus***

For most of the surveyed people, palms are a symbol for holidays in Southern countries (61.1%) and only 11% of the respondents feel that palms are expensive. In recent

years, 63.7% of the surveyed people have already bought a palm. Buying palms is not popular with older people. 71.9% of the people older than 70 years have never bought a palm whereas in the age group between 41 to 50 years, a percentage of 71.2% has bought one. In general, a high household income increases the willingness to buy palms significantly while 75.3% of the group with a monthly net income of € 4,000 per household have already bought a palm and only 50% of the respondents with a monthly net income below € 1,000 did so in previous years. As shown in Figure 2, 84.2% of



**Figure 3.** Relative importance of the plant characteristics (n = 293).

**Table 1.** Part-worth functions of the palm's characteristics (n = 293).

Overall benefit			
Characteristics of the palm	Parameter value	Part-worth functions	Standard error
Price	Price 1: € 129.-	0.533	0.070
	Price 2: € 159.-	0.167	0.070
	Price 3: € 189.-	-0.699	0.070
Habitus	Compact	-0.187	0.053
	Wide	0.187	0.053
Withstand against wind	High	0.802	0.053
	Low	-0.802	0.053
Cold hardiness	Impossible	-2.187	0.070
	Possible with protection	0.357	0.070
	Possible	1.830	0.070
Constant		4.795	0.055

the respondents believed that palms in gardens need warmth and 69.5% think that they are sensitive. But also 31.6% of the respondents stated that palms in gardens are survivable and 76.9% of this group already bought a palm.

To get an insight to how the different attributes of the new palm *T. wagnerianus* influence consumers' choice, a conjoint measurement as described previously was included in the survey which was carried out by 293 respondents. When analysing the relative importance of the plant's characteristics for purchasing a palm, the cold hardiness was the most important factor with a relative importance of 46.5%. But with both palm varieties not

being completely winter-hardy, this factor cannot be used in the argumentation pro *T. wagnerianus*. As seen in Figure 3, the factor "price" is not of that high importance than one could have expected. The relative importance of the price is at 20.6%. That is, close to the high withstand against wind with an importance of 19.8%. The habitus of the palm is with 13.1% of low importance.

Regarding the part-worth functions of the analyzed palm characteristics (Table 1), the strongest impact on the consumers' choice has the characteristic "cold hardiness" with the parameter value "possible" with a positive part worth of 1.830. This shows that the surveyed consumers have a rather positive attitude and a certain preference

**Table 2.** Comparison of consumer estimations of different palm varieties.

Variable	Preferred parameter value	Part-worth function	Given parameter value	Part-worth function	Given parameter value	Part-worth function
Cold hardness	Possible	1.830	Hardy with protection	0.357	Hardy with protection	0.357
Withstand against wind	High	0.802	High	0.802	Low	-0.802
Price	€ 129.-	0.533	€ 189.-	-0.699	€ 159.-	0.167
Habitus	wide	0.187	Compact	-0.187	Wide	0.187
Constant factor		4.795		4.795		4.795
Aggregated part-worth functions		8.147		5.068		4.704

for a winter-hardy palm which – ideally – can survive the winter in open ground in their garden. When analyzing the “withstand against wind” the surveyed consumers prefer “high” with a part-worth value of 0.802. Concerning the price of the palm, the highest part-worth with a value of 0.533 was calculated for the lowest price of € 129 while the highest price of € 189 achieves a negative part-worth value. This result is in line with the expected negative linearity of higher prices of products as suggested by consumer theory. A wider habitus was judged as more positive than a compact habitus (Table 1). According to the results of our survey, the optimal palm would get aggregated part-worth functions of 8.127 (Table 2). But this palm was not available on the German market so far, since it represents a simulation of the ideal plant. When the given characteristics of the palms which are available on the German market were compared, it was seen that *T. wagnerianus* and its characteristics are more preferred by the surveyed people than those of *T. fortunei*. Altogether, *T. wagnerianus* gets an aggregated part-worth function of 5.068 compared to 4.704 of *T. fortunei* (Table 2). The reason therefore, is the higher withstand against wind of *T. wagnerianus* which is preferred by the surveyed consumers. Therefore, this characteristic can be used in marketing activities for *T. wagnerianus* as this characteristic is one of

the big differences to *T. fortunei* and positively evaluated by the respondents. It can also be easily shown and explained at the point of sale to the customers.

### Conclusions

The results of our survey gave an insight in consumer behaviour and preferences with respect to new varieties of palms on the market of horticultural plants in Germany. Despite limitations in the representativeness of the sample regarding for example, area covered, education level and income status of the respondents, the study contributes in identifying major factors which influence consumer behaviour and preferences in this field. The identified consumer preferences as well as, the collected data concerning the used information channels for new plant varieties support the development of target-groups oriented marketing activities for these plants. Furthermore, they help to develop appropriate information and communication activities in this field. Further research activities could complement the collected information in particular concerning consumers' willingness to pay for specific palm varieties and the required information when promoting this type of plants as well as, the interest of plant retailers in new plant varieties. Considering all results

together, it can be expected that *T. wagnerianus* has a good chance to win market shares in the market of horticultural plants in Germany. In traditional nurseries, it could be a suitable product as consumers appreciate expert advice which can be ideally provided in this shop type with respect to the palm and its special characteristics. As shown in other consumer studies, customers of horticultural products in Germany regard personal advice provided in traditional nurseries as one major advantage of this distribution channel compared to garden centres or DIY stores (Menrad and Fink, 2005; Rothenburger et al., 1996). To increase the publicity and availability of *T. wagnerianus*, a suitable activity could be to spread the palms amongst plant-retailers as consumers mainly inform themselves about horticultural novelties while shopping in a store. Thus, *T. wagnerianus* needs to achieve a certain distribution level so that potential consumers can have a chance to get familiar with this rather unknown plant. Palms in common are regarded as a strong symbol for holidays. Considering the “homing”-trend, palms for gardens can offer holiday-feeling to peoples' homes and catch up to the trend to “Mediterranean gardens” in Germany as well. Though *T. wagnerianus* is not colder hardy than *T. fortunei*, it has the advantage of the high withstand to wind which makes it the first choice for customers even with a higher price as

shown in the results of the conjoint experiment in our study.

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