# Chapter 6

# Care and Handling

The following TEKS will be addressed in this chapter:

(6) The student knows the management factors of floral enterprises. The student is expected to:

(A) use temperature, preservatives, and cutting techniques to increase keeping quality;

(B) identify tools, chemicals, and equipment used in floral design;

(C) fertilize, prune, and water tropical plants;

(D) manage pests; and

(E) demonstrate the technical skills for increasing the preservation of cut flowers and foliage.

**Care and Handling of Cut Flowers and Foliages**

Cut flowers, even though they have been separated from the parent plant, are living, actively metabolizing plant parts. These parts undergo the same basic aging process as the entire plant — only quicker. However, the rate of deterioration can be slowed down considerably by supplying the cut flower with its basic needs. The first and foremost need of a cut flower is water. Second is food. In addition, certain damaging factors such as exposure to ethylene gas, microbial attack and rough handling must be avoided.

From a practical point of view, a controlled rate of opening is needed as well as maintenance of good color. All of these factors must be considered by everyone who handles the product. This includes growers wholesalers and retailers.

In order to be competitive in the marketplace our product must be desirable to the consumer. Our flowers must be fresh for the customer to enjoy!

***Factors Affecting Quality***

There are several factors which play a part in keeping the quality of cut flowers at a high level: (1) the grower (2) moisture balance. (3) nutrient balance (4) temperature, (5) humidity, (6) ethylene, and (7) microbial activity. At first, some of the factors seem more important than others. These factors are all inter-related and it is difficult to determine which would be the most important. However, if one factor can be considered more important, once the wholesaler has received the flowers, it would have to be moisture balance.

*The Grower*

The grower plays a very important part in determining the post-harvest lasting qualities of cut flowers. The National Floriculture Conference on Commodity Handling says that it has been estimated that 70% of the post-harvest characteristics are predetermined at harvest. This estimation, even if it is high, should make us want to become aware of the practices and procedures that growers are using in producing cut flowers. Even if you provide optimum conditions for your flowers, it will not do much good if you receive them in a state of poor quality.

This production factor (the grower) may be divided into three categories: (1) genetic, (2) environmental (3) management.

Genetic

The genetic material make-up of a flower can determine its lasting ability. Roses are the only flower in which much research has been done to determine and produce only the cultivars which have the longest vase life. This research is continual in order to provide the best product for the consumer.

Environmental

The environmental factors of greatest importance are light intensity, spacing and temperature. The effect of shade cloth on a greenhouse has little effect on the lasting quality of flowers grown in the winter; however, the effect of shade cloth is more pronounced in the summer, where too much shade has been shown to reduce the vase life of Chrysanthemums by five to seven days.

The spacing of plants is important because if spaced too close, the amount of carbohydrates stored will be reduced. This amount of carbohydrates stored is the result of photosynthesis and with plants closer together, less foliage gets direct light and this cuts down on the area which is able to efficiently photosynthesize.

Finally, temperature has an effect on vase life. It has been shown that roses have an increased vase life if grown at 69 degrees Fahrenheit rather than 59, 64, 75, or 80 degrees Fahrenheit. Not only does it affect the vase life of roses, but flower pigmentation can be affected. There is less color at higher temperatures.

Management

The management practice which has the most significant effect on the lasting qualities of cut flowers is the application of fertilizer and insecticide. While the plant needs the proper fertilizer to produce a flower of high quality, over fertilization can have detrimental effects. For example, it has been shown that too much nitrogen applied to chrysanthemums will decrease bloom size and shorten vase life, and that increased potassium causes abnormally thick stems.

*Moisture Balance*

Once you have received the cut flowers the important thing is to provide water immediately. The flower needs to take up as much water as it is using and losing. This natural loss of water is called TRANSPIRATION. Most flowers are lost through wilt or dehydration because moisture is transpired out of the flower quicker than it is taken in through the stem. A high level of moisture in the petals (turgidity) is necessary for the flowers to develop from a bud into a mature blossom.

Retention of water is very important and can be aided by the use of PRESERVATIVES. One chemical in most commercial preservatives that helps water retention is dextrose. Dextrose helps to keep the leaf pores (stomates) partially closed and this slows down transpiration. Dextrose also acts as food for the flower.

Another important consideration is the quality of the water. Factors such as fluoride, pH and total dissolved salt can play an important role in determining the vase life of cut flowers. It is known that amounts of fluoride in excess of 1 ppm can be detrimental. The resulting damage is a browning and shrinking of areas of both petal and leaf tissue. Vase life will be considerably increased when the pH of the water is in the 3.0 to 5.0 range. The third factor in determining water quality is the amount of total dissolved salts (TDS). It has been shown that water containing over 100 ppm can shorten the vase life of cut flowers.

*Nutrient Balance*

Once water balance has been established with a solution of water which is of a reasonable quality and a preservative containing dextrose, the next important thing is to establish a nutrient balance. Well, in actuality, the nutrient balance was already established when the moisture balance was established. It is the ingredient of dextrose in the floral preservative that established this balance. Dextrose extends the vase life of flowers by replacing the natural sugars that are used up by the flower.

It is especially important to provide the dextrose now since many growers are making a once over harvest, rather than hand harvesting and judging each flower as to its stage of maturity. Consequently, many tight buds are being cut and shipped. Dextrose is needed as a source of carbohydrates for a bud to mature into a fully open blossom.

(Note: the often used word sucrose, common table sugar, is rarely an ingredient in commercial preservative due to its high cost. Sucrose would also encourage the growth of bacteria.)

*Temperature*

The next important factor in determining shelf life is temperature. A decreased storage temperature results in decreased transpiration which in turn delays death, thereby resulting in a longer vase life. Respiration is actually the use of food to release energy and produce growth.

It has been found that roses at a temperature of 59° F. respire at a rate three times as fast as at a temperature of 41° F. The rate of respiration is six times as fast at 77° F. than it is at 41° F. In other words, one day at 77° F. is equivalent to six days at 41° F!

The refrigeration temperature plays an important role in determining vaselife; however, not all flowers have the same optimum storage temperature. Such tropicals as orchids, anthuriums, poinsettias, bird-of-paradise, and gingers need to be stored at a warm temperature of about 45-55° F. On the other hand flowers such as roses, gardenias, and tulips prefer a storage temperature of about 33-35° F. In the middle are the flowers which are happy at 40° F. Some of these are gladioli, carnations, lilies, and chrysanthemums For a more complete list see Appendix II.

Because of the differences in temperature requirements, it would be ideal to have three coolers that are kept at each of the above temperatures. The greatest amount of square footage should be cooled to 33 - 35 degrees F, with the second largest being cooled to 40 degrees F and the smallest kept at a temperature of 50 degrees F. Since this may not be practical, one refrigerator set at 35 - 40 degrees F, would accommodate most flowers.

*Humidity = Moisture Content Of The Air*

Temperature is not the only important factor in the cooler. Humidity plays an important role in extending the vase life of cut flowers by conserving water loss due to transpiration. Low humidity can actually pull moisture from your flowers and the shock of this dehydration accelerates the aging process. A relative humidity of 90% is recommended for most flowers stored in the refrigerator.

*Ethylene*

Even though cut flowers may be in the ideal holding solution under ideal refrigeration, they are still susceptible to the death-inducing ethylene gas. Sources of ethylene gas include the normal healthy tissue of the flower, damaged foliage and diseased tissue. In other words, ethylene is produced by the flowers themselves — to hasten the maturing process. The symptoms of ethylene damage are…downward bending of leaves; premature withering or rapid

development and aging; dropping of leaves, florets, or berries; yellowing of foliage; changes in petal coloring; and inward curving and closing of opened petals (sleepiness in carnations).

Carnations, roses, snapdragons and several varieties of orchids are sensitive to exposure to ethylene gas and fade as a result. Not all flowers fade in response to ethylene gas. Gladioli and chrysanthemums do not fade but suffer from a reduction in vase life.

There are several things that can be done to keep ethylene damage down to a minimum. Since damaged and unhealthy tissues are ethylene producers, the obvious thing is to remove any tissue falling into that category. Keep the refrigerator clean; do not allow old flowers and foliage to be kept past their usefulness. Do not store evergreens, fruits and vegetables in the refrigerator as they are big ethylene producers. Ethylene production is affected by temperature. At temperatures of 40 degrees F. and below, ethylene production is greatly reduced and it takes longer for the gas to affect the flowers. Since most of the refrigerated area is kept at 40 degrees F. or below, this is a major step in controlling the damage done by ethylene gas.

*Microbial Activity = Bacteria*

Microbial activity, if allowed to exist, can reduce the vase life of cut flowers considerably. The bacterial organisms do their damage by plugging the stem of the flower.
This plugging of the stems reduces the water intake capacity which in turn shortens the vase life.

To prevent or keep the damage at a minimum, the best practice is good sanitation. Flower storage containers (buckets, vases, proconas) should be clean enough so that you would not object to drinking from them! After each use, the container should be washed and disinfected, inside and out, with a commercial bucket cleaner (such as DCD) or bleach. The refrigerator floor should be washed once per week. All foliage should be removed from the lower stem that would be underwater in the storage container. Foliage that stays under water will rot producing harmful bacteria and releasing ethylene.

***General Recommendations***

As can be seen, there are many post harvest factors which affect the life of cut flowers and foliage. Each factor is interwoven with the others so consideration must be given to each and to all. The following recommendations are based on the preceding information.

*Keep Good Records*

Keep good up-to-date records so you will be able to rate your suppliers according to the quality of flowers and foliage they provide. Handle the incoming flowers carefully — they are the life-blood of the floral business.

*Receiving, Unpacking, And Processing*

Avoid delays in processing the flowers. Remember transpiration is going on even though the flowers are out of water!

When the flowers arrive at the shop, they should be unpacked without delay. Loosen or remove the wrappers because the blossoms will increase in size as they mature and to let ethylene escape. Remove the lower foliage and any damaged or diseased parts.

Give the stems a fresh cut. Most flowers will last longer if the ends of the stems are held underwater and cut with sharp cutters. This practice prevents bubbles of air from being forced into the stem as they are plunged into water. Stems that are too ungainly to be cut underwater should be cut with a knife at an angle. The angular cut prevents the stems from acting like a suction cup on the bottom of the storage container, and makes it easier to insert them into wet floral foam.

Tough woody stems should not be crushed, but pithy stems may be broken, however

cutting underwater is the best overall practice.

Be sure to place flowers and foliage into clean containers that hold tap water (approx. 100 degrees F.) with measured preservative added. If unpacking and processing flowers must be delayed then open the shipping containers (to release ethylene gas) and set them in the refrigerator. Sprinkle the foliage and blossoms lightly to prevent dehydration.

*Conditioning*

All flowers should remain in their tap water solution outside the refrigerator for a period of time until they can absorb water and become turgid. This is called conditioning. Most flowers will absorb a maximum amount of water in one to two hours. You will notice that they feel fresh and "perked up" instead of soft and spongy. Some flowers that are shipped in bud such as gladioli, lilies, alstroemeria, and carnations could sit at room temperature overnight (or even longer) to open up and reach optimum condition.

*Forcing*

Many kinds of flowers can be forced into bloom from the bud stage. This means holding the flowers in the optimum atmosphere. This ideal atmosphere is accomplished with preservative solution, high humidity, and light. The preservative provides nutrients for respiration. Creating humidity can be accomplished by covering the flowers with a clear plastic bag or by misting, and this prevents dehydration of the buds and blossoms through transpiration. Light is important for photosynthesis which is required for the plant processes.

*Hardening*

When the flowers have absorbed the maximum amount of water and reached the preferred stage of maturity, they should be placed in the refrigerator. This act of cooling the flower so that it becomes crisp and "hard" is known as hardening.

*Refrigeration*

In the retail shop, the refrigerator is the home of the cut flower until it is passed on to the consumer. So the cooler must be adjusted to provide the best possible conditions for the life of the flowers. Low temperature slows down the activities of the flower. As the temperature goes down, so does the rate of respiration and transpiration, the activity of bacteria, and the effects of ethylene.

Each flower and foliage has its own temperature preference for longevity (See Appendix 1). Several coolers would be the ideal solution because a temperature compromise will shorten the life potential of at least one type of flower at some time.

Humidity in the refrigerator is of equal importance to temperature. High humidity reduces water loss through transpiration therefore preventing dehydration of petals and leaves. Flowers last longer in an atmosphere of 90% humidity.

Air circulation is also important to eliminate any warm spots and to remove the ethylene gases that accumulate in the cooler. The refrigerator is the single most important piece of equipment in the flower shop. The florists' reputation depends upon it! Don't compromise by settling for a "good deal" on a grocery or produce unit. The investment of a professional floral refrigerator is well worth it.

## ***Tips For Handling Roses***

*Processing*

Immediately upon receipt:

1. Unpack, remove wrapper and inspect:

Bacteria accumulates, mildew forms, and of course ethylene is trapped inside tight wrappers. Air should be able to circulate freely between flowers and stems.

2. Clean lower leaves (using gloves, towel, potato masher, electric cleaner). Be careful not to cut or damage bark.
3. Recut stems underwater (especially if they have been out of water over one hour).
4. Use good water with preservative (read directions of preservative). Some preservatives lose their activation in metal containers. Place roses in warm water — 100 ° F. Use warmer water to open tight buds — 100-110 ° F. Warmer water — over 120 ° F. — can harm the blossoms.
5. Refrigerate after brief conditioning period at 34 °F.
6. Keep roses in a dark place (either extinguish lights or use black plastic bag).
7. Harden roses for 6 to 12 hours in dark-refrigerator. This allows time for water uptake. This helps to eliminate "bent neck".
8. NEVER TAKE ROSES OUT OF SHIPPING CARTON (DRY) AND USE IMMEDIATELY!

*Commercial Floral Food*

There are many commercial floral foods available on the market and the retail florist, wholesale florist, and grower should take advantage of their life-extending properties for cut flowers and foliage. Brands such as Floralife, Oasis, Chrysal, Rogard, and Florever are names that are commonly seen. With proper use, all of the commercial brands will extend the vase life of cut flowers and foliage.

1. Ingredients

There are three main ingredients in commercial floral preservatives; sugar (food), bactericide, and an acidifier. The sugar used in many commercial preparations is fructose; however glucose is also sometimes used. Sucrose, common table sugar, is rarely an ingredient in commercial preservatives due to its high cost. The flower is a living organism and, like all living things, it requires a source of energy or food to survive. "Sugar" is the **FOOD** for the flower. Once cut from the plant, the flower has only a limited reserve of food to draw upon for that energy. The sugar, (fructose), added to the water in commercial preservatives, supplies that source of energy so that the flower may continue to mature and open properly.

The drawback of adding sugar to preservatives is that bacteria also thrive on sugar. Bacteria are almost everywhere; on the flower stems, in the air, in the vase, on your hands, etc. Bacteria act as a plug in the bottom of flower stems restricting water flow into the vascular system. The result is a wilted flower. Because of this, it is necessary to add a **BACTERICIDE** along with the sugar to prevent rapid and uncontrolled bacteria growth. The two commonly used bactericides in commercial preservatives are 8-HydroxyQuinoline Citrate (8-HQC) and Physan.

The third major ingredient is an **ACIDIFIER**, usually citric acid or aluminum sulfate. The correct pH of the preservative solution is essential for proper water uptake. Acidic water, (a pH of 3.5-5.5 is ideal), moves more readily within the stem. Citric acid also helps to control bacteria and other microbes in conjunction with the bactericide.

2. Procedure

It is important, when using a commercial preservative, that the solution be completely mixed. A lump of un-dissolved preservative can clog the flower stem just as bacteria and/or dirt do in unsanitary containers. Always start with a clean, non-metallic bucket or container. Metal containers react chemically with the acidifiers in the preservative and render them less effective. Fill storage containers about 1/3 full and vases for arranging about 3/4 full. Use tepid water. Cold water traps more air and this dissolved air can collect and impede water flow up the

stems. Add the correct amount of floral preservative for the amount of water in the container, (check manufacturer's rate of use), and stir until dissolved. If you are using a clear container and notice a white precipitate settle to the bottom, do not be alarmed. This is simply the preservative at work, combining with harmful salts and minerals and taking them out of solution. This is a little unsightly in clear glass containers, so mix the solution in one container and transfer after the precipitate has fallen to the bottom, or use one of the new "crystal clear" preservatives that will not precipitate out. When adding water to vases, buckets, containers, etc., always replace with a pre-mixed water/preservative solution to assure proper concentration.

3. Why Use Preservative

Why should the retail florist, wholesale florist, or grower invest in a commercial floral preservative? First, a commercial preservative is scientifically blended to the correct proportions of sugar, bactericide, and acidifier. This is not possible for the retail florist, wholesale florist, or grower who needs large quantities. Home-made preservatives are merely "rough" estimates and cannot compare to the accuracy of commercial brands. The wrong combinations and proportions can mean the difference between longer life and early death. The second reason; in a side-by-side test, commercial preservatives will be 40-80% more effective in extending vase life than the best home-made type. This could mean anywhere from 3-8 additional days of vase life! The third reason for using commercial preservatives is cost. Penny for penny, commercial floral foods are much less expensive to use, especially on a large scale.

Why should the retail florist, wholesale florist, or grower use a commercial floral preservative if turnover of fresh flowers is rapid? The main reason is the customer. The floriculture industry is in business to service and retain their customers and one of the best ways to keep customers satisfied is to provide an excellent product. To the consumer, excellence in cut flowers is not only their beauty, but their longevity, their vase life. If each step of the industry, from the grower to the retail florist neglects to use a floral food, they are decreasing the potential vase life of the flowers and short changing their customers.

Since the effectiveness of a commercial food at room temperature declines due to growth of bacteria over several days, it is recommended that flower storage solutions in containers of tropicals that are not in the refrigerator, be changed every third day. The general public is more educated now than ever before, and they will very quickly stop purchasing a poor quality product that gives little satisfaction.

## ***Pre-Treatments***

There are three major cut flower pre-treatments on the market; silver thiosulfate (STS) treatments, 1-methyleopropene (MCP) and citric acid hydration (CA) treatments. All three of these pre-treatments are the result of current technology and an increased awareness for the need to improve cut flowers longevity. "Pre-treatment" is a term used to describe a procedure used PRIOR TO the normal usage of a floral preservative. A pretreatment adds one more step to the daily care and handling regime. However, this one additional step can add many days to the vase life of specific flowers. It must be stressed that pre-treatments are to be used in conjunction with the use of a high quality floral preservative, otherwise the maximum benefits of the treatment program are lost.

### *Silver Thiosulfate (STS)*

The purpose of using STS is to inhibit the effects of ethylene gas. The unchecked effect of ethylene is different for each type of flower, but in general it causes rapid aging or deterioration of the flowers. In carnations ethylene causes "sleepiness"; lilies - bud drop; dendrobium — bud and flower drop; snapdragon — blossom drop; baby's breath — bud drop. For many flowers,

such as alstroemeria and lilies, the effect of STS is not only an extension of individual flower longevity, but a dramatic increase in bud opening too.

*Ethylene Block*

MCP (1-methyleopropene) is an environmentally friendly treatment that prevents the negative effects of ethylene gas. Trade named EthylBloc, MCP has been shown to be nearly as effective in the post-harvest care of ethylene sensitive flowers as STS (silver thiosulfate).

MCP (EthylBloc) is easy to use and a large quantity of flowers may be treated at one time. The product comes in powder form and is mixed with a provided solution that releases the MCP into a gaseous form. The treatment must take place in an enclosed area, such as a cooler or portable plastic tent, to concentrate the gas around the flowers. Treatment time varies with temperature. Once treated, flowers are protected from internal and external sources of ethylene. Toxicity is minimal and generally not a consideration.

*Citric Acid (CA)*

Roses are still one of the most popular cut flowers in the United States. Pre-treatment may be one step that can increase their vase life.

Water with a lower pH tends to facilitate rapid uptake by the stems. Citric acid has the ability to lower the pH of the water without creating a toxic environment for the flower. Roses, due to their internal stem structure, seem to benefit more from a CA treatment than most other flowers.

The rapid hydration, (water uptake), that occurs using a CA treatment with roses accomplishes two things. First, it assures that the flower will be completely turgid, (full of water), in the shortest time possible, which is critical when processing dehydrated flowers. Second, since the flower is completely saturated with water, a clean, unobstructed pathway is created for the follow-up procedure of using a floral preservative.

The first type of treatment procedure for CA is much like that of STS. Simply place the freshly cut (underwater if possible) stem, in the CA solution, and let stand at room temperature for about 1 hour. Then place in a high quality floral preservative solution and put in the refrigerator. DO NOT re-cut stems prior to placing into preservative solution.

The second type of treatment for CA is called a "quick dip". As its name implies, the procedure is to dip the freshly cut stem ends into the quick dip CA solution for 1-2 seconds. Then transfer to a preservative solution without re-cutting stems.

It must be stressed that these two solutions are NOT THE SAME! The quick dip is a much higher concentrate and leaving the stems in this solution for more time than recommended will cause severe stem burning. Follow manufacturer's directions carefully.

*Pulsing Solutions*

These highly concentrated solutions are compounded for the sole purpose of "energizing" flowers that have to be shipped long distances. They are usually used by growers, on only a few kinds of flowers. Pulsing solutions are not used on all flowers. The solution is usually made up of 10-20% sugar (dextrose) for food and 150-200 ppm biocide to prevent or control post harvest diseases.

### *Care and Handling Terms*

Acidifier — any chemical that reduces the pH of a solution; citric acid is the most common acidifier in commercial preservatives and brings the pH of the water to an optimum level of 3.5-5.5.

Anti-transpirant — any number of chemicals and/or waxes applied to the surface of plants and cut flowers to reduce transpiration.

Bio-inhibitor (biocide) — any chemical that retards the growth and activity of bacteria and other microorganisms in cut flower water.

Blueing — a bluish cast which develops on flowers (typically red roses) due to cold damage or ethylene exposure.

Citric Acid — a naturally occurring compound (citrus plants) that acts as an acidifier in many commercial preservatives and bud opening solutions.

Conditioning — process of allowing flowers to take up water at room temperature to insure maximum turgidity.

Dextrose — the sugar ("food") used in many commercial preservatives.

Dry-Pack — storage or shipping of flowers out of water (dry). Temperature and humidity must be monitored closely for this method to be successful.

Ethylene — a hormone that stimulates (accelerates) the aging process. Colorless and odorless, ethylene can damage many of our commonly used cut flowers such as carnations, snapdragons, lilies, etc.

Expiration — the natural drying process of a flower (bloom) by exhalation of moisture.

Field Heat — the heat that remains in the flowers once they have been harvested from the field. Field heat needs to be removed as quickly as possible to prevent loss of vase life.

Floral Preservative — a hydrating solution which expands the vascular system and secures capillaries in a diluted form, allowing the stem to take up water quickly and continually.

Fructose Sugars — the sweetest of all naturally occurring carbohydrates and used in many commercial preservatives.

Giberlaic Acid — keeps the chlorophyll in the stems and leaves.

HQC — 8-hydroxyquinoline citrate, a biocide used in many commercial preservatives.

Hardening — a care and handling process procedure in which the flowers are placed in a cooler for maximum turgidity.

Hydration — the act of a plant taking up water.

Hydration Solution — a solution, usually containing citric acid, that facilitates rapid water

uptake, therefore reducing the stress of prolonged dehydration.

pH — the measure of acidity or alkalinity of a solution. 7.0 is neutral with higher numbers indicating alkalinity and lower numbers indicating acidity.

Precipitate — to become insoluble and separate out from a solution.

Preservative — term used to describe a chemical compound used to extend the vase life of cut flowers. Commercial preservatives contain a sugar, biocide, acidifier, and other ingredients.

Pre-cool — the rapid cooling of flowers to remove field heat. Typically accomplished by injecting cold/humid air into cut flower boxes prior to shipping and/or refrigerated storage.

Pre-Treatment — a procedure used PRIOR TO the normal usage of a floral preservative. STS and Citric Acid are two common pre-treatments.

Phototropic — a flower's response to light, i.e. tulips and snapdragons will follow the light in your cooler.

Processing — preparing flowers and foliage and subsequently placing them into a preservative or pre-treatment solution.

Post-Harvest — the period following the cutting, packing, and shipping of the crop to the wholesale florist.

Pulsing Solutions — contain 10 - 20% sugar and 150-200 ppm biocide. These solutions "load" the flower with sugars (for food) and biocide (for disease control) before they are shipped long distances. Unfortunately these highly concentrated solutions only work on a few cultivars — not all flowers in general.

Relative Humidity — the amount of water vapor present in the air at a given temperature compared to the maximum amount the air could hold at that same temperature.

Respiration — process of breaking down carbohydrates and sugars inside the flowers and plants (cells) to supply energy for survival.

Shrinkage — product that is never sold due to spoilage or breakage ... sometimes referred to as dumpage.

Sleepiness — ethylene induced damage to carnations. Exhibited by inward curving of petals; flowers appear limp.

TDS — total dissolved solids. A measure of the number of dissolved solids (salts, etc) in a solution.

Transpiration— the loss of water, usually in gaseous form, from plants through small openings in leaves called stomata. Temperature and humidity directly affect the rate of transpiration.

Turgid — fully engorged with water.

Vascular system — the internal plumbing of a plant that carries water and nutrients.

Vase Life — the useful life of a cut flower after harvesting; also known as keeping quality and shelf life.

Water Clarifier — keeps the water clean and from getting murky.

Water Quality — the characteristics of water that influence the effectiveness of the addition of preservatives or pre-treatments.

## CARE AND HANDLING OF CUT FLOWERS

| Commodity Flowers | Storage Temp. Degrees F. | Comments |
|---|---|---|
| Acacia | 40 | Keep in plastic bags. Needs humidity. Dries quickly. Use at last minute. |
| Alstroemeria | 40 | Refrigerate after opening, long lasting, needs humidity. |
| Anemone | 45 | Condition for at least 1 hour before harding. |
| Anthurium | 56 | If fresh, store at room temperature. Temperature below 50°P. will damage. |
| Aster | 40 | Bent necks are common, does not store well for long periods. |
| Bird of Paradise | 45-55 | Open blossoms manually. |
| Calendula | 40 | Condition for at least 1 hour before hardening roll. |
| Calla | 40 | To straighten stems, roll in newspaper before cooling. |
| Carnation | 33-40 | Needs humidity, sensitive to ethylene gas. |
| Chrysanthemum | 33-40 | Loosen bunch, handle carefully to prevent shattering. |
| Cornflower | 40 | Loosen bunches, remove excess foliage and stems. Buds will open in bright light. |
| Daffodil, Narcissus | 33 | Remove rubber band and store in separate container, (their sap will harm other flowers). Needs humidity. |
| Daisy | 33-35 | Loosen bunches to prevent crushing. |
| Delphinium | 40 | Needs humidity, use immediately as lower petals quickly drop. |
| Freesia | 33 -35 | Needs humidity, sensitive to ethylene gas. |
| Gardenia | 33-35 | Handle carefully to prevent bruising. Store in waxed boxes. Place wet cotton or facial tissue on petals. |
| Gerbera | 35 | Recut stems every 2 days. Suspend from chicken wire into storage container to straighten necks and prevent bruising stem ends. |
| Ginger | 55 | Likes humidity, temperature "below 45°F. will damage. |
| Gladiolus | 35-40 | Sensitive to fluoride, needs humidity. Especially responsive to preservatives. |

## CARE AND HANDLING OF CUT FLOWERS

| Commodity Flowers | Storage Temp. Degrees F. | Comments |
|---|---|---|
| Gypsophelia | 40 | Loosen bunch. Keep container clean. Needs humidity. Place in warm water with plastic covering. |
| Heather | | Sheds when dry, needs humidity. |
| Iris | 40 | Handle carefully. Needs humidity. Sensitive to ethylene. |
| Lily | 35-40 | Remove pollen and most foliage. Change preservative solution every 2 days while forcing. |
| Lily of the Valley | 35 -40 | Needs humidity. Especially responsive to spray sealers. |
| Orchids | 33 | Store in waxed boxes to prevent damage from air circulation. |
| Orchids, spray type | 45-55 | Submerge in room temperature water to condition. Cover flowers in storage vase with plastic bag to retain humidity. |
| Peony | 33-35 | Loosen bunches. Drafts are harmful. |
| Poinsettia | 55-60 | Sear stem ends with flame immediately after cutting. Completely submerge in room temperature water for several hours before using. |
| Protea | 40-50 | Cut stems, use preservative (needs the food) |
| Ranunculus | 40 | |
| Roses | 34-36 | See "Tips on Handling Roses" |
| Snapdragon | 33-35 | Loosen bunches. Very sensitive to ethylene gas. |
| Statice | 33-35 | Loosen bunches to prevent mildew. |
| Stephanotis | 40 | Needs humidity. Puncture storage box to allow ethylene gas to escape. |
| Stock | 45-50 | Cut stems. Loosen bunches to prevent mildew. Likes humidity. Change water frequently as the water sours quickly. |
| Tulips | 40 | Retain wrapper. Sensitive to ethylene gas. Store separately from Daffodils and Narcissus. |
| Woody Stems (Forsythia, Peach, Quince, etc.) | 33-35 | Cut stems. Place in warm water. Cover with plastic to retain humidity. |

**Notes**

1. Do not store fresh fruit and evergreens in the same refrigerator with flowers unless they are sealed in plastic bags. These materials give off ethylene gas, which causes sleepy Carnations, Gypsophelia, Orchids Roses and petal drop of Snapdragons, and Tulips.
2. Tough woody stems should NOT be crushed. This was thought for many years to be a good way to open up hard stems, but in reality crushing the stems only damages the cells in the vascular system and reduces hydration. (water up-take).
3. Most tropical flowers, especially arithuriums, ginger, helaconia Stephanotis and spray orchids respond to being submerged underwater for 15 to 60 minutes immediately after unpacking.

## CARE AND HANDLING OF CUT FLOWERS

| Commodity Flowers | Storage Temp. Degrees F. | Comments |
|---|---|---|
| Asparagus:<br>Sprengeri<br>Tree<br>Plumosus | 40 | Needs humidity. Store in moist bag for short periods and in preservative solution with plastic bagcovering for long periods. |
| Boxwood | 33 | Keep moist in storage box. |
| Croton | 40-55 | Keep stems in shallow water (1/2") |
| Eucalyptus | 35-40 | Change water every 3rd day as it is nearly impossible to remove all the lower foliage. |
| Ferns:<br>Maidenhair<br>Brake (Flat fern)<br>Leatherleaf (Baker)<br>Woodwardia | 33-40 | Needs humidity. Store in moist bag for short periods and in preservative solution with plastic bag covering for long periods. |
| Galax | 33 | Submerge in water for short term and place in moist plastic bags for long periods. |
| Holly | 33 | Keep moist in storage box. |
| Huckleberry | 33 | Cut stems. likes humidity.* |
| Ivy, English | 33 | Submerge in water for short term and moist plastic bags for long periods. |
| Magnolia | 33 | Cut stems, likes humidity.* |
| Mistletoe | 35-40 | Store in moist bags. |
| Palm | 45 | Likes humidity* |
| Pittosporum | 35-40 | Likes humidity, cut stems. |
| Rhodendron | 33 | Cut stems, likes humidity.* |
| Salal (Lemon Leaf) | 33 | Keep in moist storage box for short term. Use preservative and cover with plastic for long term. |
| Scotch-broom | 40 | Loosen bunches. Cut stems, likes humidity. |
| Smilax, Southern | 40 | Keep moist in storage box. |
| Smilax, Garland | 40 | Keep moist in plastic bag. |
| Evergreens:<br>Cedars<br>Junipers<br>Firs<br>Pines | 33 | Cut stems and place in preservative solution. For large quantity, keep in storage box. If necessary to store evergreens in same refrigerator as cut flowers, be sure they are tightly sealed in plastic to prevent ethylene gas from damaging other fresh flowers. In northern climates all evergreens can be stored outside. Need high humidity. |

* Responds best to storage in plastic bags when possible

**Concepts of the Care and Handling of Foliage and Flowering Plants**

Growing plants indoors has become a national pastime. There are many reasons for this increased interest in plants. 1) Plants add a touch of nature to our homes and brighten our indoor surroundings during the long winter months. 2) Large plants may be used instead of furniture. 3) Many people collect plants as a hobby. 4) Growing and caring for plants can be therapeutic by making one feel better and teaching patience and responsibility. 5) Spectacular flowers give one a sense of excitement. 6) Plants provide a challenge to some people by trying to get as many members of a certain group of plants as they can or by growing groups of rare plants. Whatever the reason, the foliage and flowering plant industry is booming and many new types of plants are being introduced to satisfy the demand.

***The Plant's Morphology (anatomy or structure)***

The first thing to know about house plants is that they are different from the plants grown outside in the temperate zones. Most of our foliage plants come from tropical climates and are adapted to warmer conditions. Foliage plants respond to the same year around night time temperature (65-75 degrees F) as humans. Tropical plants are accustomed to little seasonal fluctuation in day length and light intensity.

**Typical Foliage Plant Conditions**

| | |
|---|---|
| Temperature | 75 degrees F average |
| Light Intensity | 75 to 500 foot candles |
| Day length | 8 to 12 hours/day yearly |
| Humidity | 40 to 70% |
| Soil | Evenly moist |
| Fertilizer | 10-10-10 (or similar) |

Of course, there are many tropical plants which depart from these typical conditions and their special needs must be recognized. Memorization of the conditions is easy, but that will not help you answer questions of why, what, when. To understand what is actually happening with a plant, you need a basic understanding of what processes take place. The following will explain some of these various processes.

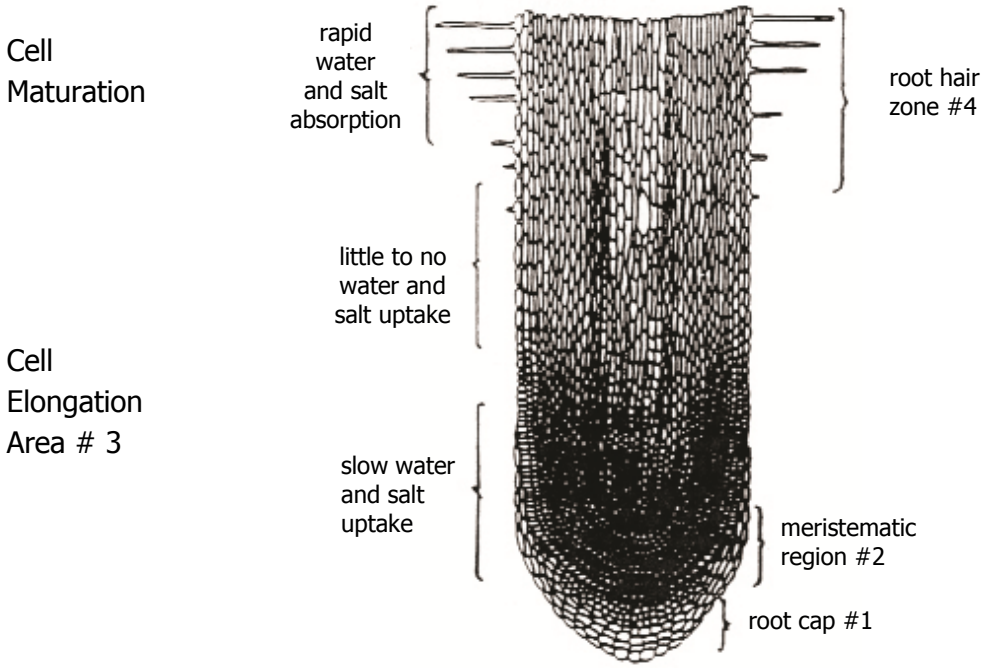
*Roots*

Roots are marvelous organs that are responsible for several processes essential to the growth and development of the plant. When we look at a plant, we see only half of it. The other half is probably just as large as the part you see. Few people are aware of how large a root system is because we hardly ever see all the roots exposed at one time. Roots have three functions: 1) They anchor and support the plant, 2) absorb water, nutrients and some pesticides, 3) Serve as a food storage organ. Even though, the root system has four different areas (Fig. 1) . Water and nutrients are slowly absorbed in the regions of cell elongation and cell division. However, water, nutrients, and pesticides are more rapidly absorbed in the region of maturation where the root hairs are located. Root hairs are single cell modifications of the roots epidermis (skin), not true hairs.

These structures tremendously increase the root surface area, thus enhancing rapid uptake of the water nutrients and pesticides. Because of the functions of the root hairs it is important

to keep as many alive as possible. The loss of the root hairs greatly reduces the water and nutrient uptake. The entire root also needs air provided by the proper soil type. If the soil is allowed to become too dry or too wet the roots and root hairs will wilt and die. When this occurs the roots can no longer perform the necessary process of absorption and uptake of the vital water and nutrients.

**Figure 1. Root Structure**




*Stems*

To this point, we have looked at the lower end of the plant and its environment. Now let's look at the above ground portions of the plant. Stems may be upright, trailing or vining. Stems have three functions also: 1) support the plant, 2) store nutrients and water, 3) conduct water and nutrients and water from the roots to the leaf (like a bridge between the underground portions to the leaves). Stems may grow above or below ground and some plants have no obvious stems at all.

*Leaves*

As we move up the plant, the leaf is the next major structure. They are the food factories. The leaf has been partially water-proofed with a wax like coating called the cuticle (Fig. 2). The thickness of a leaf cuticle varies greatly among different kinds of plants. Those with a thicker, more complete cuticle are more drought and high light intensity tolerant. There may be some gaps or thin spots in the coating, but generally the cuticle coats the leaf enough to prevent much direct water loss. Under the cuticle is the epidermis a layer of cells a single layer thick (Fig. 2). The epidermis is like the skin of the leaf. There are natural openings in the leaf that perforate both the epidermis and cuticle (Fig 2). They are called stomates. They are found abundantly on the lower leaf surface. However they can also be found to a lesser extent on the upper surface. The stomates function in gas and water vapor exchange. These stomates are operated by guard cells (Fig. 2) which are the mechanisms for opening and closing the stomates under certain circumstances, such as absence of light or shortage of water. The inner layers are called palisade and spongy cells (Fig. 2). Located in this area also are the chloroplasts

(Fig. 2). These inner layers are responsible for the manufacture of food and the exchange of gases and water vapor. Generally, leaves are flat and oriented toward the light. Leaves often grow larger in low light because the plant needs more leaf surface area to collect light for food production. Other structures that are leaves or considered modified leaves are thorns and spines. Prickles on roses are growths from the epidermis of the stem.

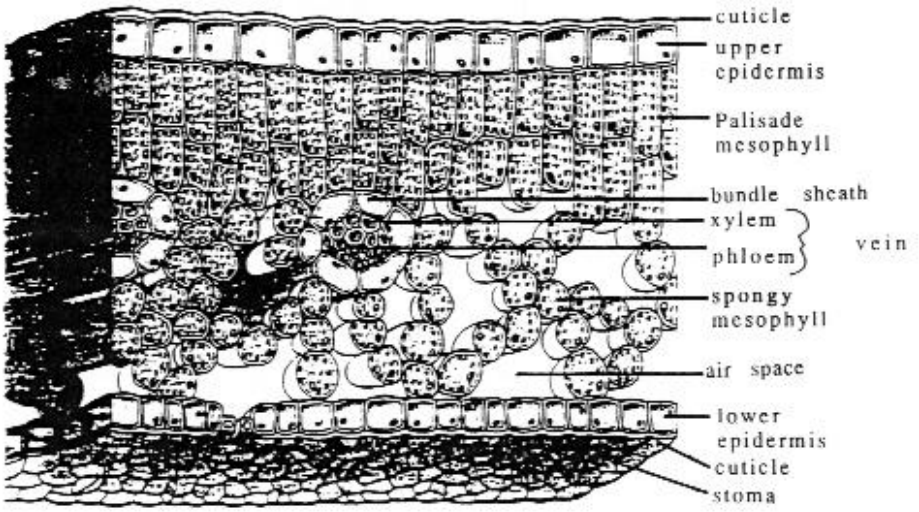
***The Plant's Physiology (Function)***

Within all the cells of the leaf are organelles called chloroplasts (Fig.2). These chloroplasts contain the green pigment called chlorophyll. This is the catalyst that makes the photosynthesis reaction work. Photosynthesis is a word composed of two smaller words photo= light and synthesis=putting together. Thus the word means putting together with light. Green plants are able to manufacture carbohydrate (sugar and starch/food) from raw material taken from the soil and air through the process of photosynthesis. This process is the most important process known to mankind. All humans and animals are dependent upon photosynthesis. We all require energy to live and grow. This energy is derived from the chemical energy of the food we consume. Ultimately, this leads back to plants, because while humans may consume animals for food, animals in turn must eat plants or other animals which ate plants. Through plants the energy of light (sun or artificial) is trapped and made available to all living things.

*Photosynthesis*

Photosynthesis, which occurs mainly in leaves of plants, uses carbon dioxide and water in the presence of chlorophyll (located in Chloroplast) and light, and transforms them into energy-rich carbohydrates (starch and sugar).This process takes place in the chloroplast. Water for photosynthesis comes from the roots up the stem to the leaves. Carbon dioxide (from humans breathing and other sources) enters through the stomates. Photosynthesis occurs and oxygen is released through the stomates. Thus helping sustain the level of oxygen in the atmosphere necessary for the continued existence of all life.

**Figure 2. Leaf Structure**




The product of most interest to us is the carbohydrate or energy produced by photosynthesis. Production of this energy is absolutely necessary for plant life. What happens to this energy? Some of it is used in the plant as building blocks for growth. Combined with minerals absorbed from the soil, it becomes new cell walls, chlorophyll, proteins, lipids (fats) or any of the many compounds involved in the plant's growth. It may be used immediately in

growth or it may (if not needed) be moved to some other part of the plant for use there or stored until needed, (e.g. humans eat ice cream (carbohydrates) those carbohydrates are used for growth in children. But for adults those carbohydrates are stored in our bodies as lipids (fat) until they are needed.

If insects or disease destroy the leaves or parts of them, the photosynthetic area of the plant is reduced. A plant allowed to wilt to the point of leaf loss may not have enough stored energy (carbohydrates) to repair itself. Such plants may die or at the least have reduced growth.

Light is the most important factor in the growth of plants. Plants use the energy of light to convert various raw materials into simple sugars, carbohydrates, and more complex organic compounds. If light is insufficient, the plants will starve, and they cannot be fed artificially. The chemical fertilizers carelessly called "plant foods" are used by the plants to produce food, but they are not food in themselves. More accurately, they are materials used by plants in the food manufacturing process.

Light, then, is absolutely necessary for plant growth. How much is necessary? Interior plants generally do not need full sunlight (they grow on the floor of tropical rain forest) however, most of them would profit from more light than they get. If your plants are not growing properly and you know that the soil conditions and water supply are adequate, light is probably inadequate. Gradually increase the amount of light each day, by moving the plants closer to the window or by drawing the curtains, or by whatever step is available. **DO NOT** place a house plant in full sun after it has been in a dark room for several weeks or it will sunburn (chloroplasts are at the leaf surface to gather as much light as possible, because of the low light). Acclimate the plant gradually. Acclimation is equally important from the opposite point of view. Plants that come in from the high light levels at the grower's should be held at medium light levels (500 fc) for three to five weeks (chloroplasts are buried deep in the inner layers of the leaf and must migrate to the surface to collect lower light) before being delivered to the lower light environments of a home or office interior.

*Light*

Understanding light as it relates to plant growth is essential to maintaining attractive plants. There are three variables concerning light and plant growth. They are 1) Light Intensity — the brightness of a location where plants will be placed: 2) Light Quality — the source of the light: 3) Light Duration — the time period during which plants will be exposed to available light. Light Intensity can be divided into categories for most plants. From a practical point of view, light intensity is the light variable which controls photosynthesis and therefore plant growth. A low-light area is generally more than six feet from windows, where there is no direct light (e.g. bathroom). Medium -light areas are roughly three to six feet from windows (well lighted room). High-light areas are within three feel of windows. (Table l) As the light is brighter photosynthesis increases and more food is produced. Most indoor plants require at least medium or high light to maintain their appearance. Blooming plants need high light to continue flowering and keep color. Generally, light intensity is measured in foot candles (fc) amount of light every 12 inches — as measured from the source.

Light Quality is the color (or wavelength) of light the plant receives. This can be the light from the sun or artificial light. Plants use chiefly two wavelengths for growth — Red and Blue. Blooming plants need more red when they are in flower. Artificial light can be used to maintain indoor green plants and keep them alive. If artificial light is used to supplement natural light or as the sole source of illumination, daylight or cool-while fluorescent lamps can be satisfactorily used. They will give a blue-green light. Incandescent lamps give a red light. You can use a broad spectrum fluorescent and that gives both red and blue such as a grow light. Light

Duration (Photoperiod) is the total amount of light a plant receives in a 24 hour period. Duration is a product of light intensity and time. Adjustments can be made for low light areas by extending the length of time of illumination so photosynthesis can continue, (e.g. if a plant receives 200 fc of light for 12 hours per day, it will be receiving a total of 200 fc X 12 hr=2400 fc hours in a 24 hour day. If only 100 fc of light are provided, the light must be on for 24 hours to provide the same total-100 fc X 24 = 2400. If only eight hours of light can be provided, the intensity must be increased to 300 fc X 8 hr=2400 fc.

*Acclimation*

Acclimation (Adaptation) is the adaptation of a plant to a new environment. The climate indoors is characterized by low light levels, dry air, and temperatures that may be too high or too low. Consequently, a better understanding of acclimation and its effects will aid the consumer in achieving greater satisfaction from plants already being grown, while improving the transfer of plants to their new growing environment. Of factors shown to be involved in the acclimation process, light has proven to be most important. Production of most plants is done under high light intensities, yielding a plant poorly equipped to grow and survive indoors, since it is adapted to survival in full sun. High light intensity also induces physiological changes within plant cells and causes the plant to produce smaller, somewhat thicker leaves that are closer together and often lighter in color (Chloroplast movement). To fully understand acclimation, one must understand the light compensation point (LCP) of the plant. This is the point at which food production (photosynthesis) is equal to food utilization (respiration). When a plant is existing at its LCP it will neither grow nor die during the short term. Unless the light is somewhat above the plant's LCP, it will not be able produce new leaves to replace those lost through aging: thus using stored food reserves. Plants at their LCP without stored food reserves will die as leaves age and become less efficient since they will drop below the LCP and consume more food than they are capable of manufacturing. Leaves of different plant genera have different life spans and this is one reason that some plants survive longer indoors even if they are below required LCP.

Although we have intimated that foliage plants grown under shade were acclimatized, that is not entirely true. Most foliage plants, even if acclimatized, will further increase their level of acclimation after placement in an interior environment. Thus, light acclimatization is an ongoing process and is not complete until every leaf on the plant has been produced under that growing environment. Therefore, it is important to match each plant to its proper light level and occasionally turn pots to provide for even growth.

*Water*

Water is the second most important factor affecting photosynthesis. Water is essential in dissolving some of the minerals from the soil needed by the plant. Also, the plant must use water in the transporting of food made in the leaves to other parts of the plant. Some of the water is lost as it rises to the leaves where it exits as a vapor through the stomates. Transpiration is the loss of water by any part of the plant body, except roots, although by far the majority of it is through the leaves. More than 90% of the water which enters the roots escapes without being utilized by the plant. Since most of these green plants are adapted to regions where the natural soil is moist, never allow the soil to become completely dry between watering. Watering will vary according to size of plant, stage of growth, relative humidity, temperature, light, potting mixture, air movement and if it is flowering. Let the look and feel of the plant soil at root zone level be your guide in determining if the plants needs water. A wooden pencil is a cheap, simple way to check plant moisture at the root level. Carbon Dioxide is another factor affecting photosynthesis. Carbon dioxide is the gas humans and animals release as they breathe. As the amount of carbon dioxide in the atmosphere increases, the rate

of photosynthesis increases to a point. The reverse is true also. If there is no carbon dioxide present in the atmosphere, photosynthesis will slow and the plant cannot produce an adequate amount of food. Scientific research has shown that plants improve the quality of the air we breathe, therefore plants in enclosed rooms (hospital rooms) have a cleaning effect on the air by using the carbon dioxide humans breathe, and giving back usable oxygen.

*Temperature*

Temperature has little effect on the rate of photosynthesis, but it is a major factor controlling the rate of respiration. The temperature should be kept at 70-75 degrees F. for daytime and 65-70 degrees F. for night time. If temperatures are allowed to drop below 50 degrees F. for an extended period of time or allowed to go above 90 degrees F. permanent damage can occur. Avoid placing plants in areas with widely fluctuating temperatures or directly in front of heating and air-conditioning vents. Remove plants from doorways or window sills to prevent cold damage during severely cold winter weather.

*Respiration*

Respiration is the opposite of photosynthesis. Respiration is the plants way of using the food that was made by photosynthesis for growth. Plants and animals use energy in the growth and maintenance process. This energy comes from the oxidation (burning) of food (organic compounds). The captured energy of light is released by means of a controlled burning of food made in the Photosynthetic process. This burning process is called Respiration. During this process food is transformed into simpler substances with the release of energy. Some energy is lost as heat; some energy is used in the movement of food throughout the plant; some of the energy is used for plant growth and development. Respiration occurs in all living cells, both plant and animal. It can occur in the light or dark. No pigment is necessary, but the age and condition of the individual cells affects the rate of respiration. So, as long as food and oxygen are present in a living cell, respiration will occur. Factors which affect respiration are the amount of food stored in the plant and, unlike photosynthesis, temperature is extremely important. At low temperatures little respiration occurs, but as the temperature rises, the rate of respiration rises dramatically.

*Transpiration*

Transpiration is the loss of water in the form of vapor from the leaf. This occurs when the stomates are open (Fig.2). There is direct movement of air into and out of the leaf. With the air, water vapor is also lost. If the air surrounding the leaf is low in relative humidity, the high relative humidity (96-98%) in the intercellular spaces within the leaf (Fig.2) will allow moisture to escape rapidly to the outside. High relative humidity around the leaf will slow this water loss. Other factors affecting the transpiration rate are light, temperature, soil moisture and air movement. Light is necessary for the opening of the guard cells which open the stomates. At night the guard cells close the stomates: thus, reducing the transpiration rate. Wind blowing over the leaf removes accumulated water vapor from around the stomates, effectively reducing the relative humidity on the outside of these openings. This increases the transpiration rate. However, the wind blowing across the leaf surface also cools the leaf, which reduces transpiration. So wind or drafts are factors which may work to either increase or decrease transpiration. It depends upon the velocity and exposure of the plant to the air movement.

It is well known that green and flowering plants help improve the quality of air by utilizing carbon dioxide and releasing oxygen into the air. NASA's research has demonstrated that plants can improve the quality of air inside sealed chambers. The plants remove trace levels of such toxic chemicals as carbon monoxide, formaldehyde and benzene. These chemicals along with

hundreds of others, are released from building materials, furniture, electronic equipment, carpets, drapes and numerous health care and personal grooming products. They accumulate in the atmosphere of closed facilities such as energy-efficient buildings.

The exact mechanism used by green and flowering plants to remove indoor air pollutants is not known, but it is being studied.

Understanding how environmental factors can be controlled is essential for growing beautiful plants.

### ***Plant Nomenclature (Plant Names)***

Plants are given names to facilitate communication about them. It has always been important for people to talk about and refer to plants. Since cave man, there have been efforts to learn which plants are used for food, medicine, etc. At first, plants were given short phrase names in Latin, consisting of a series of descriptive words to briefly characterize them and indicate their uses. As more and more plants were discovered, the phrase names became longer to distinguish between plants. This method became very cumbersome and was defeating the purpose of facilitating communication. To correct this, a method of binomial nomenclature (two names) was introduced. It is a 2 part name consisting of the *genus* (noun) and the *species* (adjective). The noun is always capitalized and the adjective usually is descriptive and is not capitalized. This is somewhat similar to your last name = genus and first name = species. Together the binomial is known as the species name.

Many plants have a third part to their name. It is called the cultivar or variety. For a plant to be given a cultivar name it has to be especially attractive, exhibit some unusual characteristic different from the species or have been created artificially by hybridization. A cultivar has to be propagated in a way that it does not change the unique characteristics of the original individual; this is sometimes called cloning. Cultivars may be named by their originator. They are given "fancy names", not Latin names. Three such examples are the 'American Beauty' rose, 'Jingle Bells' poinsettia and the tulip 'Christmas Marvel'. Cultivars can be patented just like any invention. When writing the cultivar name with the species name it is located at the end of the scientific name enclosed in single quotas, (e.g. Euphorbia pulcherrima *'Jingle Bells'*)

Many species, all of which have Latin names, may also have common names or English names. Sometimes they are merely the Latin names, or they are a translation of the Latin names. In other cases, the common name is a colloquial name which means something to people only in a certain region. In this manner, common names can be confusing (particularly when using common names over wire services). A good example of the confusion generated by common names is the aggregate of common house plants known as "ivies". There are German Ivy (Senecio mikanioides), Swedish Ivy (Plectanthrus australis) English Ivy (Hedera helix), Kenilworth Ivy (Cymbalaria muralis), Boston Ivy (Parthenocissus tricuspidata) and Grape Ivy (Cissus rombifolia) Each of the different ivies is in a totally different genus and are unrelated.

How do we deal with the problem of common names? Most people seem to want to use common names since they seem to be down to earth and popularly understood. However, these names are not necessarily logical or consistent. Also, in one region of the country, a Peruvian Violet might mean Exacum affine, but in another region you might be speaking of Streptocarpus speciosa. What would you send to the consumer? Can you see the value of scientific names? By using these scientific names confusion can be avoided.

There is only one Latin name for a plant. However, plant names sometimes have to be changed because they have been named incorrectly. This is annoying to the lay-person, but it is part of the process of scientific verification of plant identification, and this is an ongoing process. Thus, a plant name can change to a more correct name that has been found for it, or a plant name may change if it is discovered that the plant has been confused with another plant. Botanists occasionally come up with new information that they use to show better

relationships of the plants to each other. Their way of expressing this new alignment is to change plants from one genus to another, (e.g. Scindapsus aureus has a new name because the flower of the plant was discovered for the first time- its new name is Epipremnum aureum. Hence, a shift in genus to better identify the plant. This does not happen often, but it can and does happen.

For those who find scientific name; difficult, the best help is to associate the scientific name with plant materials over a long period of time. Start today learning 15 of the most common foliage and flowering plants scientific and common names. Continue this until you have a working knowledge of them.

***Botanical And Common Names For Some Foliage Plants***

| | |
|---|---|
| Rubber Tree | Ficus elastica 'Decora' |
| Umbrella Tree | Brassaia actinophylla |
| Hawaiian Schefflera | Brassaia arboracola |
| Corn Plant | Dracaena fragrans 'massangeana' |
| Boston Fern | Nephrolepis exaltata Bostoniensis |
| Dumbcane | Dieffenbachia exotica |
| Spath, Closet Plant | Spathipvllum X clevelandii |
| Pothos | Epipremnum aureum |
| Neanthe Bella Palm | Chamaedorea elegans 'Bella' |
| Heartleaf Philodendron | Philodendron scandens oxycardium |
| Nephthytis | Syngonium podophyllum |
| Saddle-Leaf Philodendron | Philodendron selloum |
| Weeping Fig | Ficus benjamina |
| Chinese Evergreen (silver queen) | Aglaonema commutatum maculatum |
| Swedish Ivy | Plectranthus australis |

***Botanical And Common Names For Some Blooming Plants***

| | |
|---|---|
| Silver Vase | Aechmea fasciata |
| Reiger Begonia | Begonia X hiemalis |
| Mum | Chrysanthemum moritolium |
| Cyclamen | Cyclamen persicum giganicum |
| Poinsettia | Euphorbia pulcherrima |
| Hibiscus | Hibiscus rosa-suiensis |
| Kalanchoe | Kalanchoe blossfeldiana |
| Easter Lily | Lilium longflorium |
| Azalea | Rhododendron hybrid |
| African Violet | Saintpaulia ionantha |
| Gloxinia | Sinningia speciosa |
| Persian Violet | Exacum affine |

***Common Houseplant Problems***

| **Common Symptom** | **Possible Cause(S)** |
|---|---|
| Brown or dead leaf tips and margins | Dry air, overwatering, underwatering too much fertilizer; Fluorotoxicity |
| Wilted leaves | Overwatering (especially if soil is soggy and has algae growing on the surface). Underwatering or plant being underpotted when transpiration is high. High level of soluble salts. |
| Leaf drop | The gradual loss of lower leaves is normal for many plants. Low humidity, overwatering, over-fertilizing, drafts, changes in environment, insects. |
| Tall and spindly plants | Low light, temperature too warm, (seedlings especially). |
| Yellow leaves | Too little light, lack of fertilizer (especially nitrogen), insects. |
| Flower and bud drop | Change in environment, low humidity. |
| Poor growth | Lack of fertilizer, overwatering, potbound, high soluble-salt level. |
| Yellow or brown spots on leaves | Overwatering, too much light. |

| **Cause** | **Effects** |
|---|---|
| Over watering | Leaves turn yellow, leaves wilt, leaves drop off, roots rot off, plant may fall over after roots rot off, soil surface and pot may be covered with green algae, small gray-to-black fly; (fungus gnats) are present in the soil and fly around when disturbed. |
| Low humidity | Leaf tips and leaf margins turn brown, leaves turn yellow or brown, leaves may fall off (especially the lower ones) leaves may wilt, buds may drop. |
| Low light | Plants tend to be tall and spindly, lower leaves drop off flowering plants fail to produce buds or buds may fall off. |
| Under watering | Leaves wilt, lower leaves drop off. |
| Too much light | Burned leaves (leaves tend to look grayish or bleached, especially those receiving the most light). |

## *Common Flowering Plants — General Reference*

FACTS: Flowering pot plants differ fundamentally from foliage pot plants in that flowering represents a transient stage of the normal plant life cycle. Therefore, the florist needs to be concerned with the dynamics of the flowering process and the conditions that alter it. The successful florist will 1.Purchase flowering pot plants that are at the proper stage of floral development at the time of delivery. 2. Provide a well-lighted, somewhat cooler area for holding and display. 3. Remove all spent blooms and declining foliage. 4. Never allow flowering plants to remain in paper sleeves. 5. Do not permit fruit or other ethylene sources to come near flowering plants. 6. Learn to remove the still useful parts of overripe plants for arrangements. 7. Keep records of successes and failures for future reference.

### African Violet & Gloxinia

**Common Name:** 1. African Violet
2. Gloxinia

**Scientific Name:** 1. Saintpaulia ionantha
(saint-PAWL-ee-a yo-NAHN-ta)
2. Sinningia speciosa
(sin-IN-jee-a spes-ee-OS-a)

**FACTS:** These two flowering plants are considered together because they belong to the same large plant family of showy tropical flowers called GESNERIADS. They are both available year-round Colors are white, pink, purple, blue and bicolors. The Gloxinia comes in the color red also. Light-Bright indirect light or partial shade (75-250 fc). Usually do well under artificial light.
**Temperature** — Optimum daytime temperatures are 70-75 degrees F. Nighttime minimum temperatures are 60-65 degrees F Does not tolerate temperatures below 55 degrees F. If exposed the new leaves will curl downward and new growth will be stopped. Humidity should be fairly high.
**Water** — Keep soil uniformly moist but not wet. Avoid splashing water on foliage. Very cold water can cause yellow blotches on the leaves.
**Fertilizer** — Fertilize every 1-2 months with a complete fertilizer.
**Problems** — Leaves can develop yellow spots if warm water is allow to dry on the foliage in the sunlight. Yellowing foliage can be caused by too much light. However, African Violets need strong light to flower.
**Lasting Quality** — African Violets will flower continuously with sufficient light. Individual flower dusters last 3-6 weeks in favorable conditions. Successive clusters provide 8-10 weeks of continuous color. Gloxinia's individual blooms last 4-6 days each, opening in succession and so providing continuous color for 2-4 weeks. Gloxinias will flower for several months with adequate light.
**Insects** — Cyclamen Mites, Aphids, Thrips and Mealy Bugs are some problems. Wash or spray with warm soapy water or use rubbing alcohol. If necessary use a registered insecticide spray.
**Disease** — Crown rot and Gray Mold can be problems if good air circulation is not provided. Destroy all infected tissue and let soil dry more between waterings.
**Uses** — Wonderful houseplants for longtime enjoyment.

### Azalea

**Common Name:** 1. Azalea

**Scientific Name:** 1. Rhododendron hybrid
(ro-do-DEN-dron)

**Facts:** Year-round, with excellent supplies in the natural flowering period of January to April. Colors are white, pink, salmon, red, purple, variegated pink and white and red and white. Becoming even more popular.
**Light** — Bright indirect light (150-250 fc).
**Temperature** — Optimum daytime temperatures 60-70 degrees F. Nighttitne minimum 50-60 degrees F Cool temperatures, especially at night, are essential.
**Water** — Moist is key-NEVER ALLOW TO DRY OUT.
**Fertilizer** — No additional fertilizer is needed while Azaleas are flowering.
**Problems** — Flowers will burn in direct full sunlight. New pale growth may extend beyond the flowers pinch out these young shoots if they cause the plant to look misshaped.
**Lasting Quality** — Individual flowers last 5-10 days, depending on variety and temperature as well as other environmental factors. Plants flower for periods of two to eight weeks.
**Insects** — Scale insects. Leaf Miners, and White Flies can be problems. Spray or treat plants with warm soapy water or a registered insecticide for the particular insect.
**Disease** — Rhizoctonia Blight can cause leaf drop, blackened patches on the stem. Cut off affected parts destroy badly infected plants.
**Uses** — These Florist Azaleas are very popular as a pot plant for decorating all interior spaces. But these plants are not bred to be planted outside.

## Begonia

**Common Name:** 1. Begonia — Reiger Begonia, Christmas Begonia

**Scientific Name:** 1. Begonia x hiemalis
(beg-OHN-ya hie-MAL-is)

**FACTS:** Reiger Begonias are a favorite with interior plantscapers. They give year around color except in northern regions. The colors are various shades of orange, red and pink.
**Light** — Bright indirect light( 150-250 fc) or more. Full sun in winter move to sunny location in the winter months.
**Temperature** — Optimum daytime temperatures are 60-70 degrees F. Nighttime minimum 55-65 degrees F.
**Water** — Keep soil uniformly moist but not wet. Do not allow medium to become 'bone' dry.
**Fertilizer** — Fertilize every month. Slow-release fertilizer applied by grower is useful in providing additional long-lasting nutrition.
**Problems** — Flowers will drop if indoor temperatures exceed 80 degrees F. Stems become soft and will rot in moist humid atmosphere; improve air circulation and allow soil to dry slightly if this starts to happen.
**Lasting Quality** — Each flower last 5-7 days or longer, and is replaced by others through the 8-10 week flowering period.
**Insects** — White Fly, Aphids and Mealy Bugs are the major insect problems. Wash with warm soapy water or spray with insecticide registered for use against the insect the plant has.
**Disease** — Powdery Mildew and bacterial leaf spot are the major disease encountered. Improve air circulation and reduce humidity. Also destroy badly infected foliage.

## Bromeliads

**Common Name:** 1. Silver Vase
2. Striped Blushing Bromeliad

**Scientific Name:** 1. Aechmea fasciata
(IKE-may-a fa-see-AHT-a)
2. Neoregelia carolinae 'Tricolor'
(NEE-o-REH-geel-ya try-kul-or)

**FACTS:** Brome1iads are among the most tolerant of indoor plants, surviving shade,, without making new growth. While many types are grown for their foliage alone, the flowers also are spectacular and long-lasting.
**Light** — Partial shade to bright indirect light (75-250 fc). Tolerates shade (25-75 fc) for up to 6 months.
**Temperature** — Optimum daytime temperatures 70-80 degrees F. Nighttime minimum 55- 65 degrees F. Bromeliads are not hardy — avoid exposure to temperatures lower than 40 degrees F.
**Water** — Soil may partially dry out between waterings. Usually, it's best to water the soil just as for other plants. Let soil dry out between waterings.
**Fertilizer** — Fertilize every 2 months.
**Problems** — Loss of pigment results from insufficient light. Handle with care to avoid breaking leaf tips.
**Lasting Quality** — Bromeliads will thrive indefinitely in good conditions and with proper care. The bloom will last 4-6 months in the interior.
**Pruning** — None needed, except for removal of crowded offshoots and faded flowers. In most varieties, the mother plant will slowly decline and die after flowering and producing offsets; prune out the dead parts just above the soil line and allow offsets to fill in.
**Flowering** — Bromeliads usually flower naturally when they attain maturity (2-3 years). They can also be induced to flower by applying ethylene-forming chemicals, or simply by enclosing the plant in a plastic bag with a ripe apple for 7-10 days. Flowers will appear 1- 2 months after this treatment.
**Insect** — Scale Insects, Root Mealybugs and Spider Mites are the major insect problems. Wash plant with warm soapy water or rub scale off with fingernail. For Root Mealybugs, the plant can be drenched with a registered insecticide.
**Diseases** — No real problems, may develop leaf spots if too humid and/or poor air circulation.
**Uses** — Color in interiorscapes, desk top plants, small rock gardens.

## Chrysanthemum

**Common Name:** 1. Pot Mum or Chrysanthemum

**Scientific Name:** 1. Chrysanthemum morifolium
(kris-ANTH-em-um mor-i-FOL-ee-um)

**FACTS:** Chrysanthemum is the second most popular flowering plant. The Poinsettia is the first. There is a wide variety of forms, sizes and colors in today's chrysanthemums. All have been developed because of individual traits of tolerance, color, form, or habit to suit current styles and the indoor climates. The pot .mum is available year-around. The colors include almost any color you want and several flower types are also available. Many growers sell plants when the flowers are not fully developed to at least 1/3 open. Under dark conditions they will not open. Allowing flowers to be half open prior to sale will permit full development of the flower after sale. When buying plants, look for full compact plants. Avoid tall, narrow plant forms or those that are staked and tied.
**Light** — Bright indirect light (150-250 fc) keep out of direct sunlight.

**Temperature** — Optimum daytime temperatures are 60-75 degrees F. Nighttime minimum 55-60 degree; F. Will tolerate as cool as 40-45 degrees F. Cooler temperatures will promote longer shelf life.

**Water** — Keep soil uniformly moist but not wet. However, mums are very forgiving so,if allowed to dry out and watered they will return to normal with a little leaf edge burn.
**Fertilizer**— No additional fertilizer is needed.
**Problems** — Leaves turn yellow and flower centers become black with insufficient light; flowers will continue to open in bright indirect light, flowers may be burned in direct full sunlight.

**Lasting Quality** — Flowers last up to 3 weeks, depending on variety as well as temperature and other environmental factors.
**Insects** — Aphids, spider Mites and Leaf Miners are the major insects on mums. Wash with or spray with warm soapy water several times. If all else fails use an insecticide registered for use against the insect and registered for use on the mum.
**Disease** — Bacterial Leaf Spot-discard plant. Not usually found on pot mums.
**Uses** — All purpose.

## Cyclamen

**Common Name:** 1. Cyclamen

**Scientific Name:** 1. Cyclamen persicum giganteum
(SYK-lam-en PER-sic-um jy-GANT-eh-um)

**FACTS:** Cyclamen have been hybridized to many large flowered forms, as well as, smaller, scented varieties (not all smaller flowers are scented). Cyclamen are available year-around, however, they are cool weather plants. Fall through spring. Tthe greatest demand is from October to February. The colors are white, and shades of pink, lavender, purple and red. Does not tolerate hot weather very well.
**Light** — Bright indirect light (150-500 fc)
**Temperature** — Optimum daytime temperatures 60-65 degrees F. Nighttime temperatures 50-55 degrees F. The plant suffers in hot dry air. Unless it can be kept in a cool room, it will degenerate from excessive wilting and failure of flower bud to develop.
**Water** — Keep soil uniformly moist but not wet, prefers humid air. Never allow to dry out completely.
**Fertilizer** — Every 2-3 weeks apply a complete fertilizer while flowers continue to develop.
**Problems** — Rotting weakened stems. Sudden yellowing of some leaves will occur 1-2 days after plant is allowed to wilt from lack of moisture. Shriveling and drying of flower buds may occur in insufficient light and or excessive temperatures, or following wilting due to drought.
**Lasting Quality** — Individual flowers last 2-3 weeks depending on temperature and other environmental factors. Each plant produces a profusion of blooms which provide color for 2-4 months.
**Insects** — Cyclamen Mites are the major insect; new leaves and flowers are distorted and curled. The only treatment is a registered mifcicide.
**Disease** — Crown Rot and Bacterial Soft Rot are the major concerns. Provide good air circulation, remove diseased tissue and plants and drench with a registered fungicide.
**Uses** — As a Christmas and Valentine pot plant.

## Hibiscus

**Common Name:** 1. Hibiscus

**Scientific Name:** 1. Hibiscus rosa-sinensis
(hi-BISS-kus- Ro-sah sin-EN-sis)

**FACTS:** Hibiscus can be obtained year-around. However, they are most abundant in the spring and

summer. They come in single and double flowers in beautiful colors of pink, red, yel1ow, orange and white plus hybrids in subtle pastels. Plants are continuous bloomers, but remember that one or two flowers a day will probably be peak production. They are outdoor plants, not to be grown indoors.
**Light** — Direct bright light: at least 500-1,000 fc. A sunny east, south or west window is ideal. Abundant light is the main requirement for constant bloom( at least 4 hours a day).
**Temperature** — Optimum daytime temperatures are 65-85 degrees F. Nighttime minimum of 55-60 degrees F. Hibiscus cannot tolerate low nighttime temperatures. DO NOT ALLOW temperature to dip below 55 degrees F. or plant may become chilled and blooming will stop.
**Water** — Keep soil evenly moist, not too wet or dry. Moderate to high humidity (40% or more) is beneficial.
**Fertilizer** — Feed with a flowering plant fertilizer (high in phosphorus) all year. Follow directions on fertilizer label.
**Problems** — Leaves and flower buds will drop if soil dries out severely or remains soggy for an extended period of time. Also, if kept in drafts of hot air they will drop. They are very sensitive to ethylene gas as low as 0.5 ppm. Unsleeve immediately and do not store with fruits and vegetables.
**Lasting Quality** — Flowers last only one day. With proper care. buds appear year-round on new growth. While blossoms are fragile, plants are sturdy and long-lived.
**Insects** — Spider Mites are the major concern. Wash and spray plant with warm soapy water several times in 2-3 weeks. Or, use a registered miticide every 5-7 days.
**Diseases** — None to be concerned about.
**Uses** — A different pot plant for all purposes.

## Kalanchoe

**Common Name:** 1. Kalanchoe

**Scientific Name:** 1. Kalanchoe blossfeldiana
(ka-LAHN-ko-ay bloss-feld-ee-AHN-a)

**FACTS:** Kalanchoe are excellent decorator plants; they provide good, long-lasting color for indoor decoration. After the flowers have faded the plants have continued value as a succulent green plant. They are usually free of insect pests. Kalanchoes are available year-round with best supplies in March-September. The colors are scarlet red, pink, salmon, oranges, yellows and creamy-white shades.
**Light** — Full sun or bright indirect light.
**Temperature** — Optimum daytime temperature 65-80 degrees F. Nighttime minimum is 60 degrees F.
**Water** — Let soil dry out between thorough waterings. New hybrids require more water and are less sensitive to over watering than older varieties.
**Fertilizer** — No fertilizer is needed while Kalanchoe is flowering.
**Problems** — Sensitive to Ethylene, maintain good air circulation.
**Lasting Quality** — Flowers last from 2-6 weeks, depending upon temperature and other environmental factors. Flowering heads taking on a bi-color effect indicates too low light.
**Insects** — Mealy Bugs can develop sometimes. Wash with soapy water.
**Disease** — Crown Rot and Powdery Mildew can be a problem. Improve aeration of soil and air circulation to help control. Avoid water on the foliage.
**Uses** — An excellent decorator plant for interior scapes.

## Lilies

**Common Names:** 1. Easter Lily
2. Hybrid Lily
3. Oriental Lily

**Scientific Name:** 1. Lilium longflorum
(LILL-ee-um lonj-i-FLOR-um)
2. Lilium
(LILL-ee-um)
3. Lilium speciosum
(LILL-ee-um spe-si-0-sum)

**FACTS:** Available March, April and May. Easter lilies come in white. The Hybrid lilies can be found in various colors white, pink, orange, yellow and red. Remove anthers in the flower before their pollen stains the petals.
**Light** — Bright indirect light or full sun (250 fc)
**Temperature** — Optimum daytime temperatures 70-75 degrees F. Nighttime minimum are 55-65 degrees F.
**Water** — Let soil dry partially between thorough waterings.
**Fertilizer** — None needed while in flower.
**Problems** — None
**Last Quality** — 7-14 days depending on temperature, number of flower buds per stem and other environmental factors. Removing the pollen also helps prolong the life of the flowers.
**Insects** — Aphids can be a minor problem. Wash off with warm soapy water.
**Disease** — Gray mold can cause leaf spots or flower buds to turn brown. Improve aeration and reduce humidity.
**Uses** — The Easter Holiday Pot plants. The other lilies can be used for Mother Day as well.

## Persian Violet

**Common Name:** 1. Persian Violet, Exacum

**Scientific Name:** 1. Exacum affine
(x-acum A-feene)

**FACTS:** This round, bushy, compact plant offers a profusion of delicate lavender blossoms with bright yellow stamens surrounded by small bright green waxy leaves. It is one of the very few fragrant plants available in the floral industry. The fragrance can be very strong even to the point of excessive in a confined space such as a hospital room.
**Light** — Keep in high light (500-1,000 fc)
**Temperature** — Optimum daytime temperatures are 75-80 degrees F. Nighttime minimum temperature is 60-65 degrees F.
**Water** — Keep uniformly moist
**Fertilizer** — To keep plants blooming a complete fertilizer will help. Apply every two weeks according to directions.
**Problems** — Low-light conditions will cause flowers to fade.
**Insects** — Mites and worms can be problems. Control with a spray of warm soapy water or a registered insecticide.
**Diseases** — Gray-Mold caused by too much fertilizer. Discard infected plants.
**Uses** — One of the few pot plants that has a fragrance.

## Poinsettia

**Common Name:** 1. Poinsettia

**Scientific Name:** 1. Euphorbia pulcherrima
(you-FORB-ee-a pul-KER-i-ma)

**FACTS:** A native of Mexico, the Poinsettia has become the traditional Christmas plant and the number one pot plant in the U.S. Recent introductions of new varieties with improved qualities have made it possible for Poinsettia to be enjoyed in the home for several months. Poinsettias have in the past been falsely accused of being toxic. Research has proven that the plant is NOT HARMFUL. "Points" come in a variety of colors, shapes and sizes Pixie, Traditional, Standard, Trees (Miniature and Standard) and Hanging Baskets. They are available from October through December. Colors range from pink to red, white, white with bicolor, pink, pink with bicolor yellow, and others will be released soon. The bracts are actually vividly colored leaves. All varieties have small yellow true flowers in the center called cyathia.
**Light** — Place in an area where there is sufficient natural light to read fine print. (150-250 fc).
**Temperature** — Optimum daytime temperatures 70-75 degrees F. Nighttime optimum 55- 65 degrees F. Tell customers not to place on top of T.V. or VCR because of the increase in temperature will dry the soil out very quickly.
**Water** — Put plant in a waterproof container to protect furnishings and water plant thoroughly when soil surface is dry to the touch. Remembering to discard the excess water. The key is to KEEP THEM MOIST at all times. Do not allow them to become dry.
**Fertilizer** — A liquid indoor plant fertilizer at the time of purchase and at monthly intervals throughout the life of the plant.
**Problems** — A dry Poinsettia with wilting foliage can usually be revived: immerse pot in tepid water for 20 minutes or until bubbles stop rising, then allow to drain while plant regains turgidity. Avoid getting any water on foliage. Droopy foliage may occur when plant has been in a dark cool place, or sleeved for more than 24 hours. Place plant in lighted area. Hopefully, it will revive in a few days. Poinsettia's are extremely sensitive to ethylene. To help prevent problems unsleeve plants immediately and avoid storing with fresh fruits or vegetables. Maintain good air circulation. Protect plants leaving the store from exposure to cold temperatures. Only a few seconds of freezing temperatures or chilling wind may kill the plants.
**Lasting Quality** — Cyathia (yellow structures in center) mature and shed pollen in 2-4 weeks. The colorful bracts may persist in good condition for several months when given proper care.
**Insects** — White Flies are the major insect problem. If a puff of white 'smoke' arises from the plant when it is moved these are white flies. Be careful not to leave water on bracts. If you use a registered insecticide make sure it can be used on poinsettias that are in bloom.
**Disease** — Botrytis Blight on bracts or Corynespora Bract and Leaf Spot are the major problems that can be encountered in the florist shop. Increase air circulation, remove infected plant parts and discard.
**Uses** — The Christmas pot plant.

## Spathiphyllum

**Common Name:** l. Spath, Peacelily, Closet Plant
2. Mauna Loa

**Scientific Name:** 1. Spathiphvllum x clevelandii
(spa-thih-FILL-um klev-LAND-ee-eye)
2. Spathipyllum x clevelandii 'Mauna Loa'
(spa-thih-Fill-um klev-LAND-ee-eye mana-Lo-a)

**FACTS:** This is one of the most attractive as well as the most free flowering of all interior plants. It has

attractive dark green, glossy lance-shaped leaves. The leaves range in size from eight to fifteen inches long. The large white flowers will remain attractive for several weeks in an indoor environment 'Mauna Loa' is a very popular easy to grow dwarf that produces many 5 inch long white flowers.
**Light** — Medium to high light levels are best, but the Spath will grow under low light (no direct light) conditions but flowering will be reduced.
**Temperature** — Optimum daytime temperatures are 65-80 degrees F. nighttime optimums are 60-80 degrees F. Temperatures below 55 degrees F. can cause damage.
**Water** — Needs to be keep uniformly moist. However, it is a very forgiving plant and will recover from severe neglect. But there will be leaf damage if this is allowed to happen very often.
**Fertilizer** — Fertilize every 2 months with a complete indoor plant fertilizer.
**Problem** — With heavy watering leaf spots will develop.
**Pruning** — Remove old yellowing leaves at the base of the plant. Also "dead head" spent flowers.
**Insect** — Few insects bother this plant. However, mites, mealy bugs and scales can occur. Wash with warm soapy water to remove.
**Disease** — Leaf Spots, blight and Anthracnose can occur. Keep foliage dry and improve air circulation.
**Uses** — The Spaths are used both as small container plants when young and as floor specimens as they mature to larger sizes. Because of their rich green color, consistent texture and low height, this plant is often used as 'facing' plants in front of groupings of larger specimens.

## *Common Foliage Plants — General Reference*

FACTS: Most foliage plants are natives of the tropics, but they are generally adaptable to indoor culture. They vary in ability to endure neglect, abuse, and abnormal conditions. Florists should familiarize themselves with the common and botanical names as well as the characteristics of the most commonly used plant species — their habits of growth, their soil requirements, and the amount of light they need to maintain a healthy green color. With this knowledge, florists will be able to help customers choose plants to satisfy their particular requirements.

### Chinese Evergreen

**Common Name:**
1. Chinese Evergreen
   Painted Droptongue
2. Silver Evergreen
   Silver King
   Silver Queen
3. Golden Evergreen
4. Chinese Evergreen

**Scientific Name:**
1. Aglaonema crispum
   (ahg-la-oh-NAYM-a KRIS-pum)
2. Aglaonema commutatum maculatum 'Silver King' and 'Silver Queen'
   (ahg-la-oh-NAYM-a kom-rnoo-TAHT-um ma-koo-LAHT-um)
3. Aglaonema commutatum 'Pseudo-bracteratum'
   (ahg-la-oh-NAYM-a SU-doe-brak-tay-AHT-um)
4. Aglaonema modestum
   (ahg-la-oh-NAYM-a mo-DES-tum)

**FACTS:** In broad outline, the Chinese Evergreen resembles that of Dieffenbachia. Some grow almost in the shape of trees, while others are low growing and shrubby. The leaves are variegated. Some species

develop colorful berries. A.modestmum is the hardiest of all the species and is the oldest and most basic member of the commercially important group. Aglaonema are excellent interior plants.
**Light** — Deep shade to bright indirect light (25-250 fc). Aglaonema are tough and very tolerant of poor lighting.
**Temperature** —Daytime optimum 70-75 degrees F. Night time minimum 60-65 degrees F.
**Water** — Keep soil uniformly moist but not wet.
**Fertilizer** —Fertilize every 2 months with a complete indoor plant fertilizer.
**Problems** — NONE — tough plants
**Storage** — Store at 60-70 degrees F. and 65-85% humidity. Aglaonemas are very tolerant of low storage temperatures, (below 50 degrees F.) however plant will lose lower foliage and develop a dull color. Most species and cultivars will tolerate 10 days in storage without light and maintain quality. After 14 days, considerable foliage loss will occur. Plants can be stored indefinitely at 50 fc or more.
**Pruning** — None required
**Lasting Quality** — Aglaonema will last indefinitely in good conditions and proper care.
**Insect Control** — Usually not bothered
**Disease Control** — Bacterial leaf spot (Pseudomonas) will develop under damp humid conditions. Keep foliage dry; improve air circulation and remove infected tissue for the area.
**Uses** — Filler plants in planters or as ground covers in large mall areas. They are excellent table or desk plants or as a large single specimen plant.

## Dieffenbachia

**Common Name:**
1. Giant Dumb Cane
   Tropic Snow
2. Exotic Dieffenbachia
   Prefection
3. Spotted Dumb Cane
   Rudolph Roehrs

**Scientific Name:**
1. Dieffenbachia amoena
   (dee-fen-BAK-ee-a a-MO-EEN-a)
   Dieffenbachia amoena 'Tropic Snow'
   (dee-fen-BAK-ee-a a-MO-EEN-a Tropic Snow')
2. Dieffenbachia exotica
   (dee-fen-BAK-ee-a EGS-of-i-ka)
   Dieffenbachia exotica 'Perfection'
   (dee-fen-BAK-ee-a EGS-of-i-ka 'Perfection'
3. Dieffenbachia maculata
   (dee-fen-BAK-ee-a mak-yoo-lata)
   Dieffenbachia maculata
   (dee-fen-BAK-ee-a mak-oo-lata 'ROO-dolf RO-ERS)

**FACTS:** Dieffenbachia is said to be at the top of the most popular foliage plants. For more than a century, about 20 species have been in cultivation from which new, constantly improved cultivars have been produced. Leaves are usually glossy, leathery and vary in size and color depending upon variety. Height varies from 2 to 10 feet, depending upon cultivar. The common name of Dumbcane comes from the fact that sap from the plant parts contains an ingredient that can cause swelling in the mouth and throat if eaten.
**Light** — Partial shade to bright indirect light (75-250 fc)
**Temperature** — Optimum daytime temperature 70-75 degrees F. Nighttime minimum 60- 65 degrees F.
**Water** — Soil may partially dry out between waterings.
**Fertilizer** — Fertilize every 3 months with a complete soluble indoor plant fertilizer.
**Problems** — Lower leaves tend to die as new ones open at the top of the cane; this can be minimized

by ensuring that sufficient light reaches all the foliage. Leggy Dieffenbachia can be air-layered just below the leaves.
**Storage** — Store at 60-70 degrees F. Dieffenbachia is one of the least cold tolerant groups of foliage plants. They can be seriously damaged if temperature is allowed to drop below 60 degrees F. Do not store without light for more than 5 to 7 days. Lower leaves will turn yellow with excessive light exclusion. Keep soil moist during storage or leaf drop may occur.
**Pruning** — Remove all dead or dying leaves and discard.
**Insects** — Aphids and Spider Mites are the major insects found on Dieffenbachia. Aphids cause younger leaves to be distorted and discolored. Spider Mites cause leaves to be mottled and dusty, yellowing and droopy. Fine webs at the growing tip and on leaves can cause drying and curling with severe infestation.
**Control** — wash whole plant with soapy water or spray with a registered insecticide for use on Aphids or Spider Mites.
**Disease** — Leaf Spot (bacterial and fungal) and Stem and Crown Rot are major diseases of Dieffenbachia. Yellow-brown or reddish spots or water soaked spots on leaves or stems are indications that the organisms are present. Keep foliage dry, improve air circulation, and reduce temperature. Remove infected tissue and discard.
**Uses** — The large specimen plants are ideal for lobbies and mall areas and smaller ones are used as filler plants and desk plants. The Dieffenbachia works well with other plant combinations, but it should be potted separately because of watering differences.

## Dracaena

**Common Name:**
1. Janet Craig Dracaena
   Corn Plant
   Warneckei Dracaena
   Dragon Tree
2. Gold Dust Dracaena
   Ribbon Plant

**Scientific Name:**
1. Dracaena deremensis 'Janet Craig'
   (dra-SEE-na day-re-MEN-sis)
   Dracaena fragrans massangeana
   (dra-SEE-na FRAHG-rans ma-SAHNJ-eh-AHN-a)
   Dracaena deremensis 'Warneckei'
   (dra-SEE-na day-re-MEN-sis war-NECK-ee-eye)
   Dracaena marginata
   (dra-SEE-na mar-gin-AHT-a)
2. Dracaena godseffiana
   (dra-SEE-na god-SEFF-ee-ahn-a)
   Dracaena sanderiaia
   (dra-SEE-na sand-der-ee AHN-a)

**FACTS:** What would interior plantscaping do without the genus Dracaena. There are 20 species from which to choose. The leaves are usually oval to lance-shaped, from three to twenty-three inches long, erect growing or tending to curve depending on the species. The color of the leaves has tremendous variability from emerald to gray-green, with yellow or white stripes or spots. Plants grow to many different heights. Depending on the variety, they can grow from six inches to fifteen to twenty feet.
**Light** — Partial shade to bright indirect light (75-250 fc). I.(group) Some species also survive (without growing) in shade as low as 25 fc.
**Temperature** — Optimum daytime 70-75 degrees F. Nighttime minimum 60-65 degrees F. 1. (group) can tolerate as cool as 55 degrees F. for short periods. 2. (group) can tolerate as cool as 50 degrees F. for short periods.
**Water** — Never allow the soil to dry out, but don't keep it saturated.
**Fertilizer** — Fertilize every two months with a complete soluble indoor plant fertilizer.
**Problems** — Leaves turn yellow and then brown with insufficient light. Leaf tips and edges often turn

brown and yellow and brown patches may occur along leaf blades. This is caused from twa factors. One, is the fluoride sensitivity. Avoid the use of fluoridated water if possible. Second, if the soil is allowed to dry out the same symptoms will occur.
**Pruning** — Lower leaves are often lost as Dracaenas grow, especially if light is insufficient for lower foliage; top portions can be air-layered. Portions of the remaining stem can be rooted for additional plants. The brown tips of the leaves are pruned off as needed.
**Lasting Quality** — Dracaenas will thrive indefinitely in good conditions and with proper care.
**Storage** — Store at 60-75 degrees F. and 75-859c humidity. Most Dracaenas will tolerate periods of up to 7 days without light and the lower leaves will not turn yellow. Plants exposed to low temperatures and low-humidity will develop severe tissue necrosis along leaf margins.
**Insect Control** — Mealy bugs, spider mites and scale insects are the most common insects seen on the Dracaenas. Washing with warm soapy water every 2-3 weeks is the best control. There are biologicals on the market and if all else fails spray with a registered chemical.
**Disease Control** — Bacterial leaf spot (Pseudomonas) and leaf spot (Fusarium Phyllosticta) are the most common diseases of Dracaenas. To control keep foliage dry, improve air circulation and remove infected leaves.
**Uses** — The Dracaenas are relatively slow growing and will thrive in the same container for years. Their glossy, leathery leaves give them good resistance to most problems and low humidity.

## Fern

**Common name:**
1. Boston Fern
   - Dallas Fern
   - Nappa Valley Fern
   - Tall Feather Fern
   - Lace Fern or Feather Fern
2. Maidenhair Fern
3. Birdsnest Fern
4. Silver Table Fern or Brake Fem

Scientific Name:
1. Nephrolepis exaltata 'Bostoniensis'
   (neff-ro-LEP-is egs-al-TAHT-a bos-ton-i-ENS-is)
   Nephrolepis exaltata 'Dallas'
   (neff-ro-LEP-is egs-al-TAHT-a dal-es)
   Nephrolepis exaltata 'Napa Valley'
   (neff-ro-LEP-is egs-al-TAHT-a nap-a val-e)
   Nephrolepis exaltata 'Rooseveltii'
   (neff-ro-LEP-is egs-al-TAHT-a ROSE-velt-eye)
   Nephrolepis exaltata 'Whitmanii'
   (neff-or-LEP-is egs-al-TAHT-a WHT-man-eye)
2. Adianrum raddianum
   (ah-dee-AHN-tum radd-ee-AHN-um)
3. Asplenium nidus
   (as-PLEN-ee-um NID-us)
4. Pteris ensiformis 'Victoriae
   (TER-is en-si-FOR-mis vic-FOR-ee-eye)

**FACTS:** Nephrolepis and its cultivars are one of the most hardy and most popular of the indoor ferns. It can decorate an area for a long time. The newer more compact cultivars have provided more diverse uses for these ferns. The other Ferns mentioned give various textures and color to the interiorscape.

**Light** — Partial shade to bright indirect light (75-250 fc) 1. Sun in winter; shade in summer or unbroken north light all year.
**Water** — Keep soil uniformly moist but not wet. Prefers humidity at 80-95%.

**Fertilizer** — Fertilize ferns every 3 months with a complete indoor plant fertilizer.
**Problems** — Brown leaf edges can result from dry air, waterlogged soils, or an accumulation of excess salt. Older fronds die naturally as fresh young growth is made.

**Storage** — Store Ferns at 60 -70 degrees F. and humidity 75-85%. HIGH HUMIDITY is very important levels below 50% will cause leaflets to brown. Ferns do not store well in the dark, so avoid storage periods longer than 7 days to prevent leaflet loss. Ethylene sensitive levels above 1 ppm will cause serious damage.
**Lasting Quality** — Ferns will grow indefinitely in good conditions and with proper care.
**Pruning** — Trim off older fronds as they die back.
**Insects** — Scale Insects, Mealy bugs, Aphids and White Flies. Wash off or rub off with fingernail. Fern; are very sensitive to chemical damage. Use only with caution.
**Disease** — Gray-Mold (Botrytis) and Rhizoctonia can be problems. Moldy gray tissue or wet soggy tissue turning brown-black near the soil line. Remove infected fronds and allow ferns to dry out; better air circulation; do not mist; reduce temperature.
**Uses** — Best used in hanging basket, around water features, or as a desk plant.

## Ficus

**Common Name:**
1. Rubber Tree
   - Abidjan
   - Decora
   - Variegated Rubber Plant
2. Weeping Fig
   - Fiddleleaf Fig
   - Indian Laurel

**Scientific Name:**
1. Ficus elastica
   (FEEK-us or FYK-us eh-LAHST-ti-ka)
   Ficus elastica 'Abidjan'
   (FEEK-us or FYK-us eh-LAHST-ti-ka AB-i-john)
   Ficus elastica 'Decora'
   (FEEK-us or FYK-us eh-LAHST-ti-ka deh-KOR-a)
   Ficus elastica 'Doescheri'
   (FEEK-us or FYK-us eh-LAHST-ti-ka DO-sher-eye)
2. Ficus beniamina
   (FEEK-us or FYK-us ben-ja-MEEN-a)
   Ficus lyrata
   (FEEK-us or FYK-is li-RAHT-a)
   Ficus retysa nitida
   (FEEK-us or FYK-is re-TOOS-a NIT-i-da)

**FACTS:** Ficus (figs) have occupied a leading position in the world of houseplants for many years. A botanical link between the different species lies in the milky liquid excreted from a cut or damaged stem. Rubber Tree grows indoors from 2 to 10 feet. There are many new brightly colored varieties being developed and used in interior plantscaping. Weeping Fig has graceful, drooping branches with long leathery shiny leaves with long tapering points. It grows from 6 to 20 feet indoors.
**Light** — Partial shade to bright indirect light (75-250 fc). Thrives in full sun when conditioned to it. Reduce shade by stages 7-14 day intervals.
**Temperature** — Optimum daytime 70-75 degrees F. Nighttime minimum temperatures are 60-65 degrees F. Will tolerate as cool as 50 degrees F. for short periods of time.
**Water** — Keep soil uniformly moist but not wet. Do not let roots set in water.
**Fertilizer** — Fertilize every 2 months with a complete indoor plant fertilizer.
**Problems** — Leaves will be lost if there is insufficient light, cold drafts, dry soil, or excessive salts in the

soil. Fig trees frequently drop some mature leaves after moving to a new location, as they adapt to the different environment.
**Storage** — Store at 55-70 degrees F. and 65-85% humidity. Ficus can tolerate temperatures as cool as 50 degrees F. in shipment without damage. Ficus vary in reaction to storage without light, but severe leaf drop can occur on some species if light is excluded for more than 7 days. Ethylene sensitive exposure to ethylene levels above 2 ppm can result in leaf drop. Severe leaf drop can occur on Weeping Fig and Indian Laurel if soil is allowed to dry out.
**Lasting Quality** — Ficus will thrive indefinitely in good conditions and with proper care.
**Pruning** — Removal of the growing tip encourages branching on vigorously growing Rubber plants though often at the sacrifice of appearance.
**Insect** — Scale Insects, Mealy Bugs and Thrips are the major insects. Clusters of brown-gray scales will develop under leaves and on stems. Rub off with fingernail or use rubbing alcohol. Mealy Bugs have a cottony white secretion on stems and under leaves. Wash with soapy water or use rubbing alcohol. Thrips-soapy water will help. If all else fails, use a registered insecticide for the insect.
**Disease** — Leaf Spot starts with tiny round bumps under the leaves, later enlarges to brown specks. Then the leaves turn yellow and drop off. Keep the foliage dry; improve air circulation and reduce temperature
**Uses**— These plants are usually used as large specimen plants in lobbies, malls, offices and homes.

## Palm

**Common Name:** Areca Palm
Bamboo Palm
Parlor Palm or Neanthe Bella Palm
Kentia Palm or Paradise Palm
Lady Palm

**Scientific Name:** Chrysalidocarpus lutescens
(kris-al-id-o-KAR-pus loo-TESS-ens)
Chamaedorea erumpens
(kam-ee- DOR-eh-a eh-ROOM-pens)
Chamaedorea elagans 'Bella'
(kam-ee- DOR-eh-a eh, EL-e-gans BELL-a)
Howeia forsteriana
(HOW-ee-a for-ster-i-AHN-a)
Rhapis excelsa
(RA -pis ex-SELL-sa)

**Light** — Partial shade to bright indirect light.(75-250 fc). Also tolerate deep shade for short periods (25-75 fc).
**Temperature** — Optimum days of 70-85 degrees F. Night time minimum 62-65 degrees F. Tolerates as cool as 50 degrees F for short periods.
**Water** — Keep soil moist but not wet. Never let soil dry out completely.
**Fertilizer** — Fertilize Palms every 2 months with a complete soluble indoor plant fertilizer.
**Problems** — Collection of dust since they filter dust from the air they need to be washed with a damp cloth or sponge periodically. This will also help in control of **spider mites** and mealy bugs.
**Pruning** — None required except to remove dead fronds.
**Lasting Qualities** — Palms thrive indefinitely in good conditions and with proper care. Palms are generally durable and long-lived plants well suited to inside environments.
**Storage** — Store at 50-70 degrees F and 65-75% humidfty Palms can tolerate dark storage for 19 days without injury. They will store indefinitely under 150 fc. However, **don't** allow the soil to dry out while in storage.

**Insect Control** — Spider mite damage looks like mottled and dusty tips on younger leaflets. Control is washing and spraying plant with soapy water, biological control or miticide.
**Uses** — Large plants can be used as specimen floor plants. Smaller palms can be used on tables and shelves or seedling palms are ideal for terriums or European gardens.

## Philodendron

**Common Name:**
1. Heart-leaf Philodendron
2. Saddle-leaf Philodendron
3. Emerald Queen Philodendron
4. Red Princess Philodendron

**Scientific name:**
1. Philodendron scandens oxycardium
   (fill-o-DEN'-dron SKAN-dens ox-i-Car-dee-um)
2. Philodendron selloum
   (fill-o-DEN-dron sell-OH-um)
3. Philodendron X 'Emerald Queen'
   (fill-o-DEN-dron em-e-reld kwen)
4. Fhilodendron X 'Red Princess'
   (fil-o-DEN-dron red prin-ses)

**FACTS:** The plant genus of Philodendron rank second in the popularity of indoor plants. Each plant species has leathery, different shaped leaves; even the young and mature leaves of a single specimen show marked dissimilarities making it difficult to describe them. Most of these plants are of the creeping or climbing type.
**Light** — 1. Deep shade to bright indirect light (25-250 fc). 2.,3., 4., Partial shade to bright indirect light (75-250 fc).
**Temperatures** — Optimum daytime 70-75 degrees F. Nighttime minimum temperatures differ.
**Water** — Keep soil uniformly moist but not wet. Red Princess-let soil partially dry between waterings. If soil dries out completely, water may run right through the pot without moistening the roots.
**Fertilizer** — Fertilize every 2-3 months with a complete indoor plant fertilizer.
**Problems** — Small leaves and spindly growth can result from insufficient light, being waterlogged, or an accumulation of excess salts in the soil. If new leaves turn black over part or all of surface; this results from extreme increase in temperature, as from 65 degrees F. to 95 degrees F.
**Storage** — Store at 60-75 degrees F. and 65-85% humidity. Most species and cultivars will tolerate dark periods up to 7 days without loss of quality and up to 10 days with just minor loss in quality. Plants should not be stored or shipped with wet foliage, especially when the possibility of bacterial infection exists. Ethylene sensitive leaves may turn grey-green or yellow and appear wilted at ethylene levels above 2 ppm.
**Lasting Quality** — Philodendrons will thrive indefinitely in good conditions and with proper care.
**Pruning** — Trim vigorously growing shoots to retain full leafiness and to encourage branching. When supported on pole or bark, pruning will maintain a given height; when it becomes too long, the tallest stem is cut back to its lowest 2 or 3 leaves, and a new shoot grows from there to assure a succession of new growth.
**Insects** — Philodendrons generally are tough plants, not usually troubled by insects. However mealy bugs can be found. Wash the plant with warm soapy water or if necessary spray with a registered insecticide for use against mealy bugs.
**Disease** — Plants generally become subject to bacterial or fungal leaf spot if grown in damp and humid conditions. Keep foliage dry; improve air circulation and reduce high temperatures.
**Uses** — Their use depends upon the Philodendron. Heartleaf can be used in hanging baskets, totem

poles and as a ground cover for large surfaces. The others are used mainly as specimen plants.

## Pothos

**Common Name:**
1. Pothos, Golden Pothos, Devil's Ivy
2. Marble Queen
3. Tricolor

**Scientific Name:**
1. Epipremnum aureum
   (eh-pih-PREM-num AR-ee-um)
2. Epipremnum aureum 'Marble Queen"
   (eh-phi-PREM-num AR-ee-um mar-be! kwen)
3. Epipremnum aureum 'Tricolor'
   (eh-phi-PREM-num AR-ee-um tri-color)

**FACTS:** Many people consider Pothos a Philodendron. However, it is not, and it has a new scientific name. There are several varieties of Pothos. Generally, the leaves are heart shaped and can be waxy and satiny. Leaves can be two to five inches in length with a tapering point. They range from dark or bluish green to marbled with white or yellow.
**Light** — Deep shade to bright indirect light (25-250 fc). Tolerates low light, however because of the variegation the plant needs bright indirect light to maintain the foliage color.
**Temperature** — Optimum daytime temperature 70-75 degrees F. Nighttime temperature minimum is 62-65 degrees F. Tolerates as cool as 45 degrees F. for short periods.
**Water** — Keep soil uniformly moist but not wet.
**Problems** — Weak spindly growth can result from insufficient light, waterlogging, or an accumulation of excess salt in the soil.
**Storage** — Store at 60-75 degrees F. and 65-85% humidity. Pothos will tolerate periods of 7 days without light in storage without loss in quality. After 10 days however, serious leaf loss will occur. Plants should not be stored or shipped when foliage is wet, especially when the possibility of fungal or bacterial disease exist. Ethylene sensitive leaves may turn off-color if plants are exposed to ethylene levels of less then 2 ppm.
**Lasting Quality** — Pothos will thrive indefinitely in good conditions and with proper care.
**Pruning** — Trim tips of vigorously growing shoots to encourage branching and fresh new growth from the base. To maintain a given height on pole or bark, cut the longest shoot to its lower 2 or 3 leaves, and a new shoot will grow from there to assure a succession of new growth.
**Insects** — Pothos is a tough plant and is not usually bothered by insects.
**Disease** — Plants generally become subject to disease in damp and humid conditions. The diseases are Root Rot, Bacterial Soft Rot and Bacterial Leaf Spot. Control — keep foliage dry; improve air circulation; remove infected tissue.
**Uses** — Pothos can be used in many ways including hanging baskets, ground covers in large areas, totem poles for desk or tables or as large planters to cover harsh walls.

## Schefflera

**Common Name:**
1. Schefflera
   Umbrella Tree
2. Dwarf Schefflera
   Hawaiian Schefflera

**Scientific Name:** 1. Brassaia actinophylla
(bruss-EYE-a ak-tin-o-FIL-la)
2. Brassaia arboracola
(bruss-FA'E-a ar-bor-a-COLA)

**FACTS:** The leaves of both Schefflera's resemble the canopy of an umbrella, thus the common name of "umbrella plant". In young plants, the long-stemmed, leathery, deep, glossy green foliage is initially divided into 3 or 5 leaflets. As the plant grows older, it divides further.
**Light** — Partial shade to bright indirect light (75-250 fc). Also tolerates deep shade for short periods of time.
**Temperature** — Optimum daytime temperatures 65-75 degrees F. Optimum night time temperatures 60-65 degrees F. Temperatures above 70 degrees F. will cause the plants to grow lanky. Will tolerate temperatures as cool as 45 degrees F. for short periods of time.
**Water** — Keep soil uniformly moist but not wet.
**Fertilizer** — Fertilize every two months with a complete indoor plant fertilizer.
**Problems** — Leaf burn and yellowing is caused by drafts and or spider mite infestation. Frequent and extreme temperature fluctuations and also excessive soluble salts from fertilizer or water) in the soil can cause this problem.
**Lasting Quality** — Schefflera will thrive indefinitely under good conditions and proper care.
**Storage** — Store at 55-65 degrees F. and 70-85 % humidity. Schefflera will not tolerate storage without light for more than 7 days without loss of quality. They will store at 150 fc or higher indefinitely. Do not allow soil to dry out in storage.
**Pruning** — Not required.
**Insect Control** — Spider Mites, Mealy Bugs and Scale Insects are the major insects of concern. Spider Mite damage makes the leaves motley, dusty and with burned margin; fine webs under the leaves, in growing tips and stem angles. Mealy Bugs leave a cottony white secretion on stems under leaves. They also can cause mottled foliage. Scale Insects are clusters of brown-gray scales under leaves and on the stems. Mottled foliage also can signal scales. Control-wash and spray plants with warm soapy water. Scale Insects are more difficult to remove because of their hard outer covering which chemicals do not penetrate. Rub off with thumbnail or use rubbing alcohol. Use chemicals registered for use against these insects.
**Disease Control** — Leaf spot (Altemaria) and Leaf spot Edema (Cercospora) Round brown spots on leaves of elongated patches on stem signal Leaf spot. Minute swellings in leaves becoming red-brown patches are symptoms of Edema. Keep foliage dry, improve air circulation. Remove infected tissue. Spray with registered fungicide.
**Uses** — Hawaiian Schefflera is becoming more popular as smaller specimen plants for home and office are needed. The larger Schefflera is most often seen in lobbies, shopping malls, etc. as a larger specimen. Seedlings work well in terrariums, dish or European gardens.

## Swedish Ivy

**Common Name:** 1. Swedish Ivy, Creeping Charlie

**Scientific Name:** 1. Plectranthus australis
(plek-TRAN-thus aus-TRA-lis)

**FACTS:** Swedish Ivy has small bright green, roundish waxy leaves. It usually grows only twelve inches tall and is a trailing plant. It produces clusters of small white flowers and blooms under high light conditions. There are variegated forms of it. Its common name came from it's first popularity as s houseplant in Sweden.

**Light** — Medium to high light conditions are needed.
**Temperature** — Optimum daytime temperatures are 60-75 degrees F. nighttime temperatures 55-60 degrees F.
**Water** — Keep soil moist to a little dry.
**Fertilizer** — Fertilize every 3 months with a complete indoor plant fertilizer.
**Problems** — If over watered it will rot.
**Storage** — Will store for only short periods of time.
**Pruning** — To keep plant growing, pinching it's growing tips will keep it more dense.
**Insects** — The only pest problems are occasionally Mealy Bugs, nematodes and White Flies. Wash with warm soapy water or rubbing alcohol.
**Disease** — Bacterial Soft Rot comes from overwatering or too high humidity.
**Uses** — It is best used as a hanging basket or as a ground cover.

## REFERENCES


Biggs, Geo. and Clyde Calvin. 1987. Indoor Plants. New York, New York: John Wiley & Sons.

Northington, D.K. and J.R. Goodin. 1990. The Botanical World: St. Louis, Missouri, Time Mirror/Mosby College Publishing.

Wolverton, B.C. 1992. Green and Flowering Plants Clean Office Air: Greensboro, North Carolina, Indoor Landscaping Inc.

Holstead, Christy. 1985. Care and Handling of Flowers and Plants: Alexandria, Virginia, The Society of American Florists.

# Notes

## Chapter 6 Student Projects

### Chapter 6 Vocabulary

BACTERIAL GROWTH: Removing all foliage from the stem that is below the water level in an arrangement helps prevent bacterial growth.

BENT NECK IN FLOWERS: Is due to the inability of water to enter the stem.

CONDITIONING: The process in which cut flowers & foliages have been tested to extend their freshness.

CUSTOMER EDUCATION: Florists must educate the customer in order to help them enjoy their flowers to the fullest extent.

DRY PACK: The storage or shipment of flowers out of water.

FLORAL PRESERATIVE: A hydrating solution which expands the vascular system and secures capillaries in a diluted form, allowing the stem to take up water quickly and continually.

HYDRATING SOLUTION: A Citric acid solution that causes flowers to take up water rapidly to prevent dehydration after flowers being dry packed.

LIGHT INTENSITY: The level of light received on a plant surface.

PHOTOSYNTHESIS: The process of converting nutrients, water, carbon, dioxide and sunlight into food for plants.

PROCESSING: Cutting flowers stems properly and providing proper treatment at any stage of the distribution process.

PROCESSING FLOWERS: Growers, Wholesalers and Retail Florist must process their flowers.

RE-CUTTING STEMS: Re-cutting stems of fresh product helps prevent stem blockage, increase water uptake, maximize the freshness of the product and keeps the stem from sealing to the bottom of the container, if the cut is slanted.

REFRIGERATION OF FRESH PRODUCT: Refrigeration of fresh product with a combination of low temperature and high humidity helps slow down respiration, reduce water lost by transpiration, slows down maturity and reduces microbial growth and development. An ideal temperature range to keep your refrigerator is at 38-40 degrees F.

RESPIRATION: Cell process in which stored food reserves are converted into useful energy for the plant.

SECONDARY COLORS: Two primary colors combined in equal amounts.

TRANSPIRATION: The process of plants losing water through stomata in their leaves.

VASE LIFE: The length of useful life of cut floral materials after being received by the customer.

**Project Idea -**

1. After learning the material about flower care, mechanics and tools, have students make "How To Videos" on the different topics. Apps such as IMovie or a digital camera may be used.

2. Have students care for tropical or other potted plants (fertilize, prune, water, manage pests) for three months, logging in results daily. Then, decorate and sell the plants.

3. Students may create greenery landscape beds around the school not only to enhance the beauty of the school, but to provide greenery cuttings for floral design. Check with your local nursery to see what will grow well in your area. Some suggested plants are:
    - Asparagus Fern
    - Pittosporum
    - English Ivy
    - Cape Jasmine
    - Holly
    - Lily grass
    - Equisetum
    - Cast Iron Plant
    - Foxtail Fern
    - Cut leaf Philodendron
    - Box wood
    - Myrtle
    - Curly Willow tree

4. Have students experiment with vase life based on temperature. Choose a specific flower/plant and test the effects of temperature on vase life by having one at proper temperature, one at a temperature that is too low, and one at a temperature that is too high. Is proper refrigeration important?

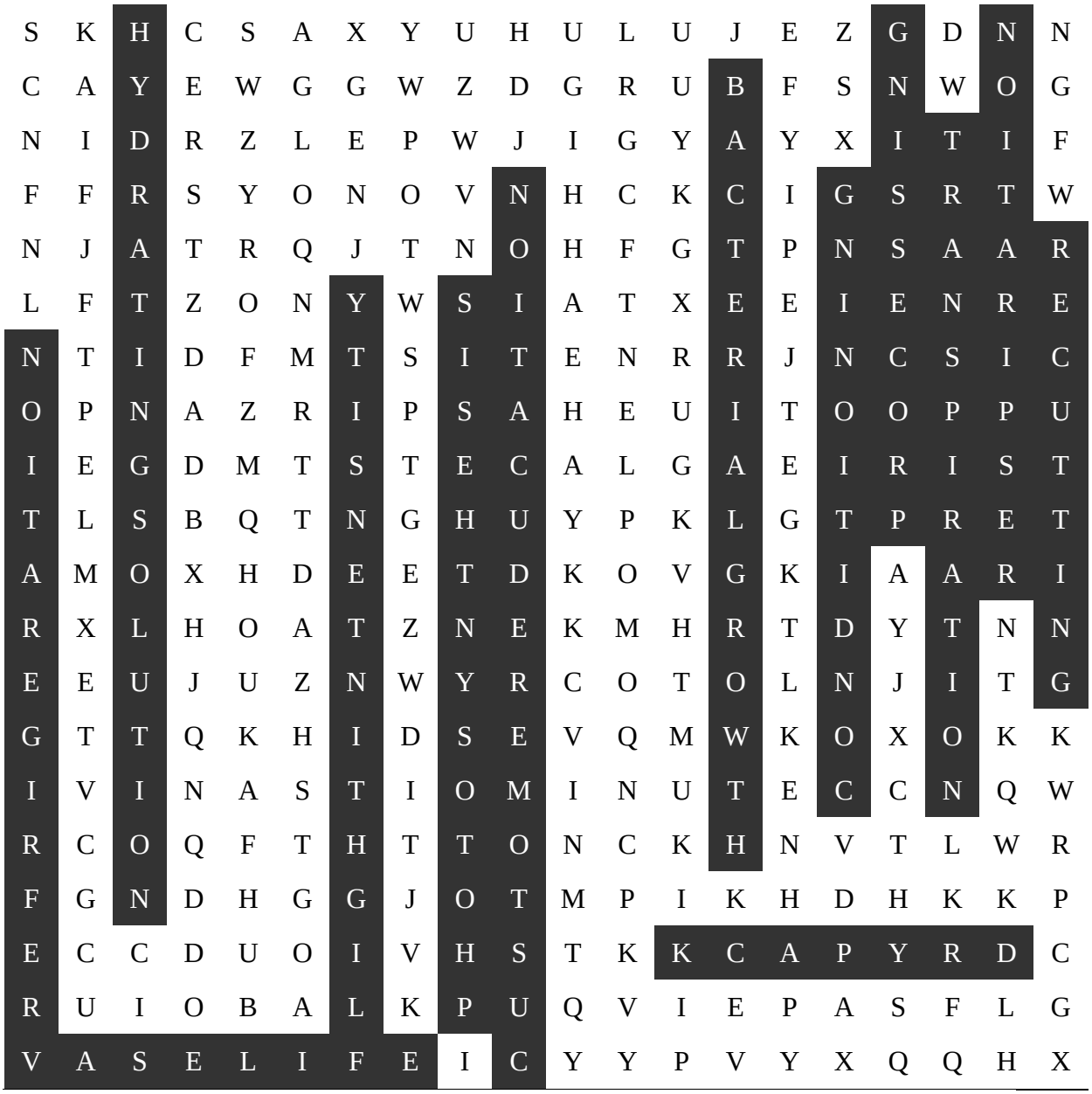
5. Compare a straight cut (like from an underwater cutter) and an angled cut (from using a floral knife). Which cut lends itself to proper intake and longer vase life?

# Care and Handling of Flowers

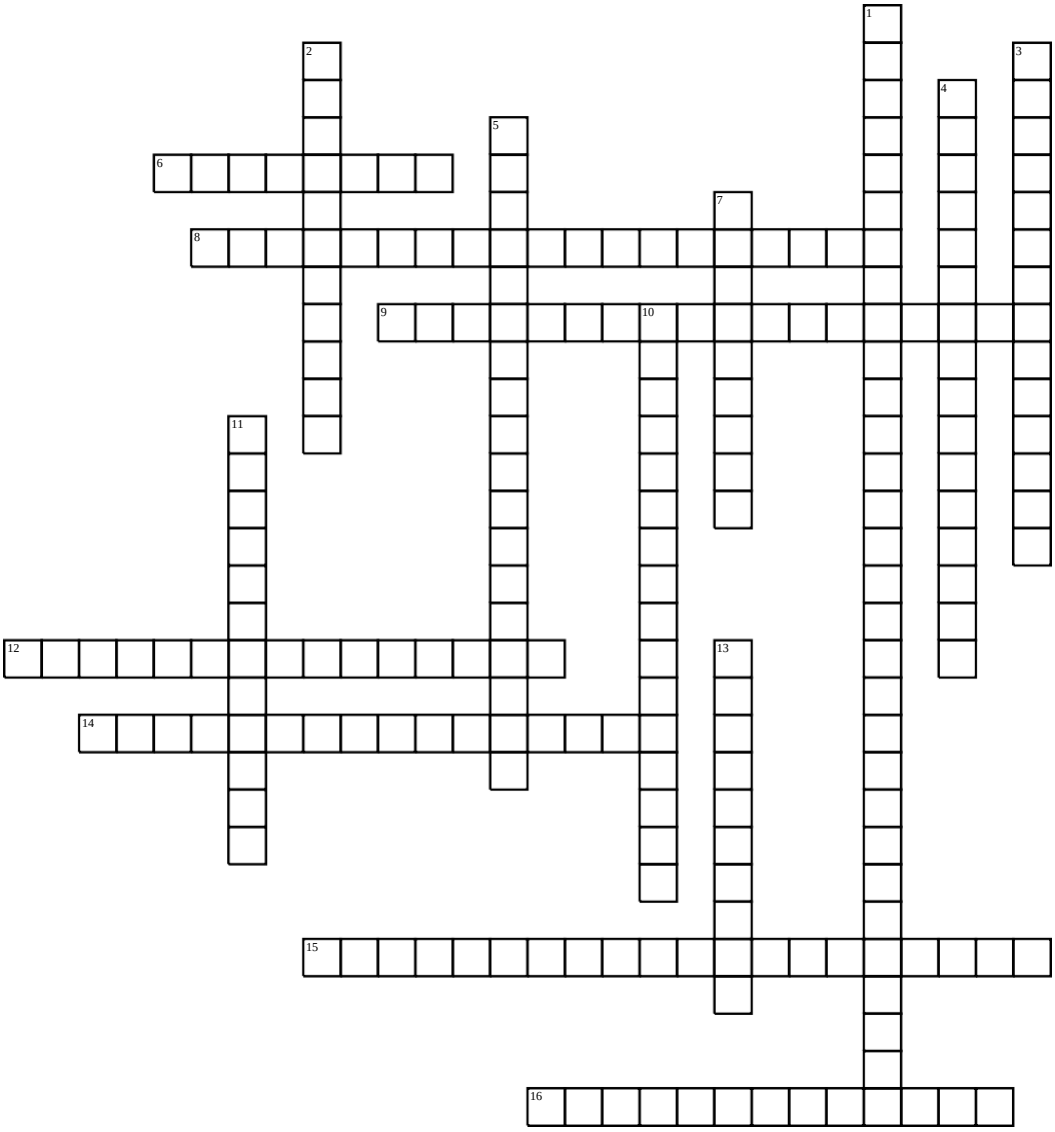
S K H C S A X Y U H U L U J E Z G D N N
C A Y E W G G W Z D G R U B F S N W O G
N I D R Z L E P W J I G Y A Y X I T I F
F F R S Y O N O V N H C K C I G S R T W
N J A T R Q J T N O H F G T P N S A A R
L F T Z O N Y W S I A T X E E I E N R E
N T I D F M T S I T E N R R J N C S I C
O P N A Z R I P S A H E U I T O O P P U
I E G D M T S T E C A L G A E I R I S T
T L S B Q T N G H U Y P K L G T P R E T
A M O X H D E E T D K O V G K I A A R I
R X L H O A T Z N E K M H R T D Y T N N
E E U J U Z N W Y R C O T O L N J I T G
G T T Q K H I D S E V Q M W K O X O K K
I V I N A S T I O M I N U T E C C N Q W
R C O Q F T H T T O N C K H N V T L W R
F G N D H G G J O T M P I K H D H K K P
E C C D U O I V H S T K K C A P Y R D C
R U I O B A L K P U Q V I E P A S F L G
V A S E L I F E I C Y Y P V Y X Q Q H X

BACTERIAL GROWTH
CONDITIONING
CUSTOMER EDUCATION
DRY PACK
HYDRATING SOLUTION
LIGHT INTENSITY
PHOTOSYNTHESIS
PROCESSING
RE-CUTTING
REFRIGERATION
RESPIRATION
TRANSPIRATION
VASE LIFE

# Care and Handling of Flowers



# Care and Handling of Flowers



**Across**

6 The storage or shipment of flowers out of water.

8 A hydrating solution which expands the vascular system and secures capillaries in a diluted form, allowing the stem to take up water quickly and continually.

9 Florists must educate the customer in order to help them enjoy their flowers to the fullest extent.

12 The level of light received on a plant surface.

14 Two primary colors combined in equal amounts.

15 Is due to the inability of water to enter the stem.

16 The process of plants losing water through stomata in their leaves.

**Down**

1 Refrigeration of fresh product with a combination of low temperature and high humidity helps slow down respiration, reduce water lost by transpiration, slows down maturity and reduces microbial growth and development. An ideal temperature range to keep your refrigerator is at 38-40 degrees F.

2 Cell process in which stored food reserves are converted into useful energy for the plant.

3 The process of converting nutrients, water, carbon, dioxide and sunlight into food for plants.

4 Removing all foliage from the stem that is below the water level in an arrangement helps prevent bacterial growth.

5 A Citric acid solution that causes flowers to take up water rapidly to prevent dehydration after flowers being dry packed.

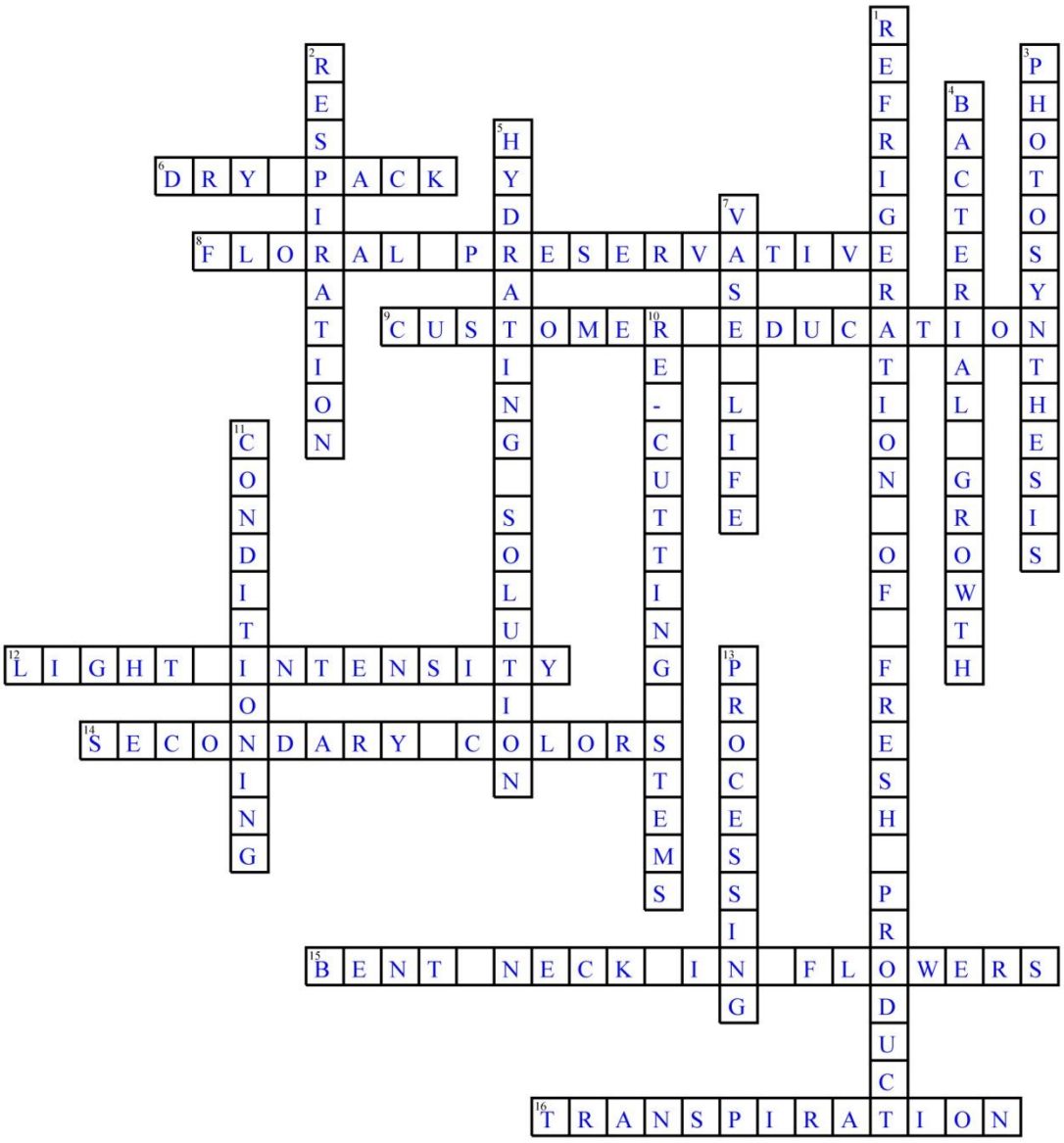
7 The length of useful life of cut floral materials after being received by the customer.

10 Re-cutting stems of fresh product helps prevent stem blockage, increase water uptake, maximize the freshness of the product and keeps the stem from sealing to the bottom of the container, if the cut is slanted.

11 The process in which cut flowers & foliages have been tested to extend their freshness.

13 Cutting flowers stems properly and providing proper treatment at any stage of the distribution process.

# Care and Handling of Flowers



# Care and Handling of Flowers Vocabulary Quiz

1) _____ Customer Education
2) _____ Bent Neck in Flowers
3) _____ Light Intensity
4) _____ Secondary Colors
5) _____ Re-Cutting Stems
6) _____ Transpiration
7) _____ Conditioning
8) _____ Processing
9) _____ Respiration
10) _____ Dry Pack
11) _____ Bacterial Growth
12) _____ Floral Preservative
13) _____ Photosynthesis
14) _____ Processing Flowers
15) _____ Hydrating Solution
16) _____ Refrigeration of Fresh Product
17) _____ Vase Life

.

a) Cutting flowers stems properly and providing proper treatment at any stage of the distribution process.
b) A Citric acid solution that causes flowers to take up water rapidly to prevent dehydration after flowers being dry packed.
c) The process of converting nutrients, water, carbon, dioxide and sunlight into food for plants.
d) The process in which cut flowers & foliages have been tested to extend their freshness.
e) Two primary colors combined in equal amounts.
f) The storage or shipment of flowers out of water.
g) The length of useful life of cut floral materials after being received by the customer.
h) Is due to the inability of water to enter the stem.
i) Wholesalers and Retail Florist must process their flowers.
j) Removing all foliage from the stem that is below the water level in an arrangement helps prevent bacterial growth.
k) A hydrating solution which expands the vascular system and secures capillaries in a diluted form, allowing the stem to take up water quickly and continually.
l) Refrigeration of fresh product with a combination of low temperature and high humidity helps slow down respiration, reduce water lost by transpiration, slows down maturity and reduces microbial growth and development. An ideal temperature range to keep your refrigerator is at 38-40 degrees F.
m) The level of light received on a plant surface.
n) The process of plants losing water through stomata in their leaves.
o) Re-cutting stems of fresh product helps prevent stem blockage, increase water uptake, maximize the freshness of the product and keeps the stem from sealing to the bottom of the container, if the cut is slanted.
p) Florists must educate the customer in order to help them enjoy their flowers to the fullest extent.
q) Cell process in which stored food reserves are converted into useful energy for the plant.

# Care and Handling of Flowers Vocabulary Quiz Key

1) P Customer Education
2) H Bent Neck in Flowers
3) M Light Intensity
4) E Secondary Colors
5) O Re-Cutting Stems
6) N Transpiration
7) D Conditioning
8) A Processing
9) Q Respiration
10) F Dry Pack
11) J Bacterial Growth
12) K Floral Preservative
13) C Photosynthesis
14) I Processing Flowers
15) B Hydrating Solution
16) L Refrigeration of Fresh Product
17) G Vase Life

.

a) Cutting flowers stems properly and providing proper treatment at any stage of the distribution process.
b) A Citric acid solution that causes flowers to take up water rapidly to prevent dehydration after flowers being dry packed.
c) The process of converting nutrients, water, carbon, dioxide and sunlight into food for plants.
d) The process in which cut flowers & foliages have been tested to extend their freshness.
e) Two primary colors combined in equal amounts.
f) The storage or shipment of flowers out of water.
g) The length of useful life of cut floral materials after being received by the customer.
h) Is due to the inability of water to enter the stem.
i) Wholesalers and Retail Florist must process their flowers.
j) Removing all foliage from the stem that is below the water level in an arrangement helps prevent bacterial growth.
k) A hydrating solution which expands the vascular system and secures capillaries in a diluted form, allowing the stem to take up water quickly and continually.
l) Refrigeration of fresh product with a combination of low temperature and high humidity helps slow down respiration, reduce water lost by transpiration, slows down maturity and reduces microbial growth and development. An ideal temperature range to keep your refrigerator is at 38-40 degrees F.
m) The level of light received on a plant surface.
n) The process of plants losing water through stomata in their leaves.
o) Re-cutting stems of fresh product helps prevent stem blockage, increase water uptake, maximize the freshness of the product and keeps the stem from sealing to the bottom of the container, if the cut is slanted.
p) Florists must educate the customer in order to help them enjoy their flowers to the fullest extent.
q) Cell process in which stored food reserves are converted into useful energy for the plant.