

Flowering Phalaenopsis: Does Magnesium or Phosphorus Applied in the Autumn Promote Flowering?

by YIN-TUNG WANG PhD

The new leaf of a healthy and well-fertilized phalaenopsis should grow quickly. A new leaf will mature every 40 to 45 days. They should be green and, on young plants, longer and wider than the leaf below or opposite to it. These plants are in a medium that consists of two parts peat, one part #3 perlite and one part #3 diatomite. RIGHT Related to phalaenopsis, Doritaenopsis I-Hsin Golden Prince 'David Goldberg', HCC/AOS {Phal. Golden Sun x Dtps. Leopard Prince). Grower: Ethel Goldberg. WITH A FEW EXCEPTIONS, ORCHID hobbyists grow orchids for their Powers. All of the orchid societies that I visit have a show-and-tell session during their monthly meetings. At each of the semiannual American Orchid Society Members Meetings, there is always an orchid show to go with the lectures and other social events. We would do anything and everything to promote flowering and, hopefully, to win some awards.

MAGNESIUM AND FLOWERING As we read articles and hear talks about how to grow orchids, we always pick up a few tips and suggestions on how to grow better orchids. One of the current issues has been using magnesium sulfate (epsom salts) on phalaenopsis to promote spiking and Powering. It is often suggested that applying high concentrations of magnesium (Mg) to the potting medium in early autumn would induce faster spiking. Magnesium is needed for the synthesis of chlorophyll for photosynthesis and food production, as well as for the function of many enzymes for metabolism. It is well established that spiking in phalaenopsis is correlated to increased levels of sucrose and other soluble sugars in the leaves. Would it be possible that high magnesium enhances photosynthesis and brings about higher levels of sugars in phalaenopsis leaves that in turn triggers spiking?

THE STUDY I have a group of large Phalaenopsis Brother Mirage 'Brother' (Paiho Rose x Frisson) plants that had bloomed for two seasons previously and were fully mature. They were repotted into 5 1/2-inch (14-cm) pots in a mixture of 70 percent fine grade fir bark and 10 percent each of chunky peat, sponge rock and milled sphagnum ° moss in May 2003. By September, their roots were well established, with a leafspan of 16 inches (40.5 cm) or longer. These plants received Peters 20-10-20 at a rate that provided 200 parts per million (ppm) of nitrogen (N), 44 ppm of phosphorus (P) and 166 ppm of potassium (K), plus the minor elements. I prepared two epsom salts (magnesium sulfate heptahydrate) solutions that gave 300 ppm (2 oz per 5 gallons or 3 g per liter) or 400 ppm (2.7 oz per 5 gallons or 4 g per liter) of Mg. I applied 200 ml (7 oz) of each solution to each of 16 randomly selected plants. Another 16 plants served as controls, which received 200 ml of reverse- osmosis (RO) water. These solutions were applied first on September 3rd and again on September 19th. Plants were checked daily for spiking. In conclusion, the control plants spiked on October 4 (averaged). Those receiving 300 or 400 ppm magnesium spiked on October 2 and October 4, respectively (Table 1, above right). It is clear that applying magnesium at these levels in early- and mid- September did not promote spiking in this particular clone of phalaenopsis.

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TABLE 1. Spiking dates as a result of applying high magnesium levels in the early fall to *Phalaenopsis* Brother Mirage 'Brother'. Magnesium (Mg) was applied on September 3 and September 19, 2003.

Magnesium Concentration (ppm)	Spiking Date (2003)	Range (2003)
0	October 4	Sept. 29–Oct. 10
300	October 2	Sept. 23–Oct. 6
400	October 4	Sept. 22–Oct. 10

TABLE 2. Effect of a high-phosphorus, low-nitrogen fertilizer on *Phalaenopsis* TAM Butterfly. (P=phosphorus).

Fertilizer Treatment	Date of Spiking	Date of Flowering	Flower Count
Peters 20-20-20	October 12	January 23	25.2
Continuous High P	October 6	January 16	18.6
Alternating High P and Water	October 6	January 15	15.0

PHOSPHORUS AND FLOWERING Another suggestion or practice that we have often heard is applying a high concentration of phosphorus in early autumn or shortly before spiking to promote spiking and to increase flower count. In one study, I used plants of *Phalaenopsis* TAM Butterfly (Taisuco Kagle X Taisuco Rose) and gave them Peters 20-20-20 at full rate (200 ppm N, 87 ppm P, and 166 ppm K) during the growing season. Some of these plants were then switched to a low nitrogen (30 ppm), high phosphorus (400 ppm) and high potassium (500 ppm) fertilizer on September 1 until the end of May the following year. This high phosphorus fertilizer was applied either at each watering or alternated with plain water. Plants that continued to receive the Peters 20-20-20 fertilizer at each watering served as controls. Twenty plants were used for each of the treatments. The medium consisted of 80 percent fine grade fir bark and 20 percent coarse peat.

The low nitrogen and high phosphorus fertilizer induced neither earlier spiking nor flowering. These plants spiked between October 6th and 12th (averaged) and flowered between January 15th and 23rd (Table 2, above). Plants that continued to receive Peters 20-20-20 produced 25 flowers, whereas those that received the continuous high phosphorus treatment and those that received the alternating high phosphorus with water treatments resulted in 19 and 15 flowers, respectively. This study demonstrated that, as long as plants have been given adequate phosphorus during the vegetative growth period, it is probably more important to continue providing a high level of nitrogen than giving them high phosphorus, low nitrogen as an attempt to get high flower count, at least not in warm south Texas. In other words, there is no need to apply an elevated level of phosphorus to a well grown healthy phalaenopsis in the autumn for improved flowering. I am not certain if high concentrations of phosphorus applied in the autumn to a poorly grown phalaenopsis would improve its flowering. Data from a preliminary study show

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that phosphorus as low as 25 ppm might be all that is needed for growing good phalaenopsis. However, more research is needed to verify this.

I also found that after the spikes of phalaenopsis have reached more than 4 inches (10 cm) in length or longer, fertilizer can be withheld completely without affecting the flower count. However, prolonged low fertility can induce nutrient deficiency symptoms such as reddish leaves (phosphorus deficiency), the loss of lower leaves (nitrogen deficiency) and reduced new growth. Studies by Prof. Nean Lee and her graduate students at the National Taiwan University have shown that spikes of phalaenopsis start to differentiate flower primordia soon after they have reached 1 1/2 inches (3.8 cm) in length. By the time a spike has reached 1 foot in length (30 cm), differentiation of all of the flower buds has completed.



TOP LEFT: This is a growing phalaenopsis leaf that shows signs of being deficient in calcium, magnesium or both. There is interveinal chlorosis and the leaf tissue that just emerged is yellowish. The veins may be ridged and the leaf may be thinner than normal. This happens most frequently during the warm months on plants receiving high nitrogen and growing rapidly with the use of reverse osmosis water.

TOP RIGHT: This leaf is deficient in calcium, magnesium or both and will not reach its potential size. The chlorotic areas may turn brownish and eventually become necrotic.

Fertilizing the medium with 100 ppm calcium (0.6 g of calcium nitrate tetrahydrate per liter of water or $\frac{1}{8}$ ounce per five gallons) and 50 ppm of magnesium (0.5 g per of magnesium sulfate heptahydrate per liter of water or $\frac{1}{16}$ ounce per five gallons) every four to eight weeks keeps plants healthy.

ABOVE: A phalaenopsis plant that received a complete fertilizer at each watering (top) and one light green plant showing red tone that is deficient of nitrogen and phosphorus (bottom).

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NITROGEN AND PHOSPHORUS IN MEDIA The phosphate ions, like nitrate ions, due to their negative charge, can be flushed out of the pots easily when excess quantities are applied to a growth medium. A study showed that when fertilizers such as Peters 20-20-20 or 20-5-19 were used at a common nitrogen concentration of 200 ppm, the straight bark and a mixture of 80 percent bark and 20 percent peat retained similar levels of phosphorus, despite the four times difference in phosphorus concentrations between the two fertilizers. Leaves of the larger plants in the bark/peat medium had lower concentrations of phosphorus than did the smaller plants grown in bark. Interestingly enough, on a per plant basis, the larger plants in the bark/peat medium took up exactly the same amount of phosphorus as the smaller plants in bark. In addition, after air-drying the medium, we did not detect nitrate nitrogen in the water extract of the bark medium, whereas the bark/peat medium had adequate nitrate. Unfortunately, for a graduate student to complete her thesis, these plants had to be harvested before they had a chance to produce flowers.

Growing excellent orchids is all about learning and mastering watering and growing good roots on them with a proper fertilizing program. I have phalaenopsis plants that grow on the plastic cover of an electrical box and on a piece of brick as well as dendrobiums being left on a hardware-cloth bench or polypropylene bench. They all produce good flowers. Go figure it out. What is the best medium for growing orchids?

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