Effects of Various Light Intensities on Germination of African Violet Seeds

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Nadeau African Violet Seeds

History and Objectives

We first reported on African violet seed germination in this magazine more than thirty years ago (Nadeau, AVM, 1978 and 1982). We stopped retail sale of our seeds in 1988 and since then have sold only wholesale. Now, as we resume retail selling using the internet, we are renewing efforts at finding the easiest and most reproducible methods for even green-thumbed-challenged growers to have fun and success while growing African violets from seeds.

Abstract

Experiments were conducted on African violet seeds to test the effects of light intensity on percent germination and time to start of germination, using 40-watt cool white fluorescent tubes. More specifically, we wanted to focus in on results from an earlier experiment in which it had been found that light of relatively higher intensity caused poorer germination than light of slightly lower intensity.

In this study, the light of higher intensity, 12.5 EV (with seeds only 2.5 inches from the tubes), resulted in a poor germination rate and longer time to onset of germination compared to germination results under light of slightly lower intensity (12.0 EV), thereby corroborating our earlier data.

In this study we also learned that relatively dim light (9.0 EV, 28 inches below the tubes), resulted in delayed onset of germination and reduced percent germination. In light of more normal intensities (10.0, 11.0, and 12.0 EV), germination was relatively high.

Light intensities at the germination mix surfaces were controlled by placing the germination pots at certain distances beneath the fluorescent tubes, the distances chosen to correspond to the desired intensities as measured using an incident light meter.

Materials

The African violet seeds were taken from the main batch of Trailer Selection seeds at our company, Nadeau African Violet Seeds. The origin and nature of our seeds is discussed at our website, NadeauAfricanVioletSeeds.com. The germination medium was Fafard Seed Starter Potting Mix, purchased at Lowe's. Pots were 3 1/2 inch square, Kord, no. SQN0350. Plastic sandwich bags used to enclose the germination pots were of the "pleated and close" type, 6.5" x 5.5" x 1".

A single 2-tube 4-foot fluorescent light fixture was used. The tubes were 4-foot Philips Alto 40-watt, cool white, purchased at Home Depot. They were operated on a cycle of 14 hours on, 10 hours off. Light intensities were measured with a Minolta Auto Meter IIIF incident light meter. At various times, Accu-Rite digital thermometer probes (from Lowes) were placed in the germination mixes until the temperatures had equilibrated to determine the temperature the seeds were experiencing. To aid in counting out 100-seed samples, a No. 5 OptiVisor, Donegan Optical Company, was employed.

Methods

Each part of the experiment was conducted in duplicate, –A and –B pots. Fafard Seed Starter Potting Mix was com-

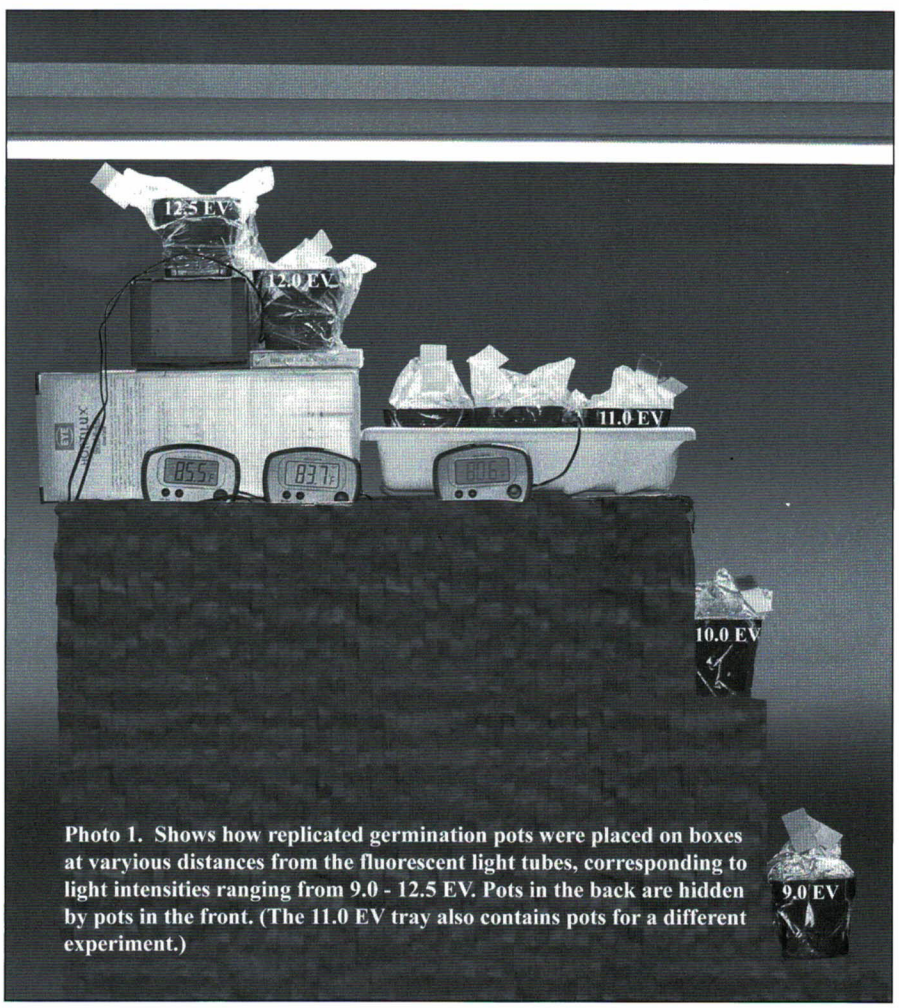

Photo 1. Shows how replicated germination pots were placed on boxes at varyious distances from the fluorescent light tubes, corresponding to light intensities ranging from 9.0 - 12.5 EV. Pots in the back are hidden by pots in the front. (The 11.0 EV tray also contains pots for a different experiment.)

bined with tap water in a ratio of 3:1 (mix:water, vol/vol). Moistened mix was put in 3 1/2 inch pots to within 1/2 inch of the top of the pot. The surface of the mix in each pot was lightly tamped down with a spoon to smooth the surface onto which the seeds would be sown. The Trailer Selection seeds (100 for each pot) were counted out ahead of time and placed in small packets. After all the pots were properly labeled (date, EV, -A or -B) and ready for sowing, 100 seeds were sprinkled over the mix surfaces of each pot, and the pots were enclosed in plastic sandwich bags with the flaps folded under the pots.

The pots were placed directly beneath a fluorescent light fixture at various distances from the bottoms of the tubes such that the "tube to seed" distances resulted in light intensities of 9.0, 10.0, 11.0, 12.0, and 12.5 EV at the seeds. See Photo 1 and Table 1. For reference, sunlight on a clear St. Louis day at noon at the start of summer gave a reading of 15.5 EV, which is 8 times more intense than 12.5 EV light. An article on EV at Wikipedia says that offices and work areas usually have 7 – 8 EV light and home interiors around 5 – 7 EV light.

To determine percent germination values, the counting of newly germinated seedlings began at 10 days after sowing and was repeated at 12, 15, 19, 23, and 33 days after sowing.

Results and Discussion

It has long been known that African violet seeds absolutely will not germinate if the germination pot is kept in the dark. They do germinate well in the presence of medium intensity fluorescent light, so we wondered if they might germinate even better, quicker, and in higher percentage, if the pots were placed close to the fluorescent tubes during the germination period. Therefore, in an earlier experiment we placed some germination pots close to the tubes and, to our surprise, this resulted in very poor germination!

In order to see if this unexpected finding was reproducible, we conducted the experiment reported here. To remove a source of variability, only seeds from our Trailer Selection batch were used, seeds that consistently have yielded a percent germination rate close to 50% under our ordinary test conditions.

The data from this experiment (Table 1) indicate that African violet seeds are sensitive to light intensities of 12.5 EV, causing them to germinate more slowly and at a reduced percent germination rate. This is a puzzling result. We considered the possibility that the close proximity of the seeds to the fluorescent tubes might have caused overheating within the plastic bags holding the germination pots, with subsequent damage to the seeds. However, temperature probes placed near the surface in the germination mixes showed that the temperature was only 2 - 3 degrees Fahrenheit higher in the 12.5 EV pots (poor germination) compared to the 12.0 EV pots (good germination). It seems unlikely that such a small temperature difference could by itself account for this dramatic effect. We will try to figure out the reason through further experimentation.

Germination was also significantly lower in dim 9.0 EV light, 33%, and by the 33rd day after sowing, the dim light seedlings were considerably smaller than the 11.0 EV seedlings. The 10.0 EV seedling size was intermediate between the 9.0 and 11.0 EV seedlings at the 33rd day.

Based on our objective of understanding the conditions that will work best for our customers, the main conclusion is that African violet seed growers can confidently place their germination containers under fluorescent tubes at distances such that the seeds are anywhere from 8 – 15 inches from the tubes. This would especially apply if they use the same kind of fluorescent tubes as were used in this study.

Further Work

African violet seeds are rather persnickety when it comes to the medium upon which they are sown. We have studied ten commercially available seed germination materials and found that only four of them give optimal results. We hope to report our germination mix findings in an upcoming issue of the *African Violet Magazine*.

References

1. Nadeau, Ronn. "Growing African Violets From Seed." *African Violet Magazine* January 1978: 7.
2. Nadeau, Ronn. "Shedding Light on the Secrets of Saintpaulia Seed Germination." *African Violet Magazine* March 1982: 36.

Table 1. Effect of Light Intensity on Time to Onset of Germination and Percent Germination.

Tube to Seed Distance (Inches)	Light Intensity (EV)	Days After Sowing					
		10	12	15	19	23	33
		Percent Germination					
28.0	9.0	0	4	14	20	29	33
18.5	10.0	0	7	17	36	43	50
10.3	11.0	0	7	21	40	50	53
5.0	12.0	0	1	17	36	50	49
2.5	12.5	0	0	2	7	10	16