Seed Germination and Nutrients

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The recommendations for a seed germinating medium have been standard for a long period of time. It has been suggested that it be rather fine and uniform; free of insects, fungi, bacteria and weed seeds; well aerated and loose; capable of holding and moving moisture by capillarity; and low in nutrient content. All of these are good points; however, the last one could lead to some trouble particularly where the peat-lite mixes may be used.

To illustrate the problem that may arise where no nutrients are added we had the Floriculture students set up a small experiment. The objective was to observe the effect of the presence or absence of calcium, phosphorus and nitrogen on the germination and subsequent growth of petunias and salvia.

The germination media for treatments 1 through 5 was made up of 50% by volume sphagnum peat moss and 50% by volume #4 particle size horticultural vermiculite. In Table 1 we've listed the fertilizer materials added to each treatment. Treatment #6 was 50% peat moss and 50% #2 vermiculite. Treatment #7 used 50% peat moss and 50% perlite as the medium.

Table 1. Fertilizer added to peat-lite germination media. Amounts are given in both pounds per cubic yard and grams per bushel.

Treatment	Amendment	lbs cu yd	gms/bushel
1	Nothing	–	–
2	Calcium limestone	5	103.0
3	20% superphosphate	2	41.2
4	Calcium limestone	5	103.0
	20% superphosphate	2	41.2
5	Calcium limestone	5	103.0
	20% superphosphate	2	41.2
	Ammonium nitrate	1	20.6
6	(Peat and No. 2 Verm)		
	Calcium limestone	5	103.0
	20% superphosphate	2	41.2
7	(Peat and perlite)		
	Calcium limestone	5	103.0
	20% superphosphate	2	41.2

The limestone and superphosphate were added as dry materials. The ammonium nitrate was dissolved in water and added as a solution. Each medium was thoroughly mixed to ensure uniform distribution of the fertilizer ingredients.

Plum purple petunia seed and Dwarf red pillar salvia

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seed were sown February 14, 1968. The seeded containers were placed in a 65° night temperature greenhouse with 70° bottom heat. Low pressure intermittent mist was applied 12 seconds every 20 minutes from 8:00 am to 5:00 pm daily. After germination had occurred the seed trays were then moved to a 60° night temperature, a 70° day temperature greenhouse.

At the time of sowing the seed a sample of each mixture was taken for soil testing purposes. Table 2 gives the analyses of the seven mixes as determined by the Spurway method of soil testing used by the Floriculture Department.

Table 2. Nutrient content of seven mixes used for germinating petunia and salvia seed. Sampled at seeding time.

Treatment	Nitrates	Phos.	Potash	Calcium	pH	TSSA[a]
			ppm in extract solution			
1	tr	tr	20	100	4.2	13
2	tr	tr	20	100	5.8	16
3	1	10	25	100	4.0	60
4	5	15	40	100	5.4	61
5	110	18	45	125	5.3	110
6	4	20	25	100	5.2	64
7	2	20	10	100	5.1	74

[a]TSS—Total soluble salts, 1:2 soil-water ratio.

These analyses show the effect on the nutrient content of the various mixes. The limestone addition increased the mixture pH as would be expected. Superphosphate, when added alone, had a slight depressing effect on pH. The ammonium nitrate addition resulted in a substantial increase in nitrates and it also caused a greater availability of potassium from the vermiculite. Part of the variability in the levels of the other nutrients may be attributed to sampling procedures. Unequal distribution of limestone and superphosphate in a relatively dry mixture would account for some of this variability.

Figures 1 and 2 show the amount of growth that had obtained one month after sowing seed. It is obvious from these illustrations that the addition of nutrients is an important factor to the success of the peat-lite mixes. It is also obvious that nitrogen additions will substantially reduce the time from sowing to transplanting stages of growth over just the addition of either limestone or superphosphate. The petunias in treatment 5 were at the ideal stage for transplanting three weeks after sowing. The salvia were ready for transplanting two weeks after sowing.

The petunia plants in treatments 1 and 2 are obviously a long time away from being ready for transplanting. Unless given some liquid feed they will remain a long time away from transplanting.

Although the recommendations for a seed germinating medium state that it should be low in nutrients this demonstration points out the fact that as soon as the seed has germinated and exhausted its stored food reserves there must be some nutrients externally supplied for the plant to

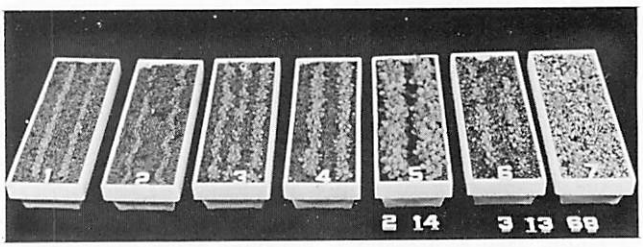

FIGURE 1. Plum purple petunia seed germinated in seven mixes. Sown 2-14, photo 3-13-68. Container three was sown with three rows of seed.

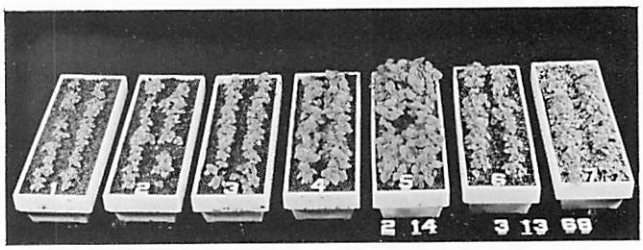

FIGURE 2. Dwarf, red pillar salvia germinated in seven mixes. Sown 2-14, photo 3-13-68.

continue making unchecked growth. This is particularly true when the peat-lite mixes are used since they contain very little available nutrients except for potassium from the vermiculite. Even soil mixes may be deficient in the necessary nutrients added. If they were present when the seed was sown, application of water may result in substantial losses by leaching.

In Table 3 are listed the nutrient levels of the mixes at the time of transplanting on March 8, 1968, three weeks after sowing. The reduction in nitrates from treatment 5 was substantial. Part of this was undoubtedly due to

Table 3. Nutrient content of seven mixes used for germinating petunias and salvia seed. Sampled at transplanting time, three weeks after sowing seed.

Treatment	Nitrates	Phos.	Potash	Calcium	pH	TSSA[a]
			ppm in extract solution			
1	tr	2	15	100	4.6	11
2	tr	tr	15	100	5.7	17
3	tr	6	15	100	4.3	48
4	tr	5	20	100	6.0	27
5	tr	tr	12	100	6.6	10
6	tr	4	12	100	6.1	29
7	1	1	5	125	6.4	10

[a]TSS—Total soluble salts, 1:2 soil-water ratio.

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losses by leaching, but much also went into the plant tissue. Similar reductions were seen in the levels of phosphorus and potassium. Notice also that the pH values have risen to higher levels. This is a cumulative effect of the addition of the fertilizer materials plus water, temperature and time affecting chemical reactions in the mixes.

In conclusion, the addition of limestone, superphosprate and ammonium nitrate to the peat-lite mix resulted in stronger, larger seedlings produced in a shorter period of time than in unfertilized mixes. The commercially available peat-lite mix already contains these nutrients so no fertilizers need be added to them.