

DOMESTIC VS AFRICAN VERMICULITE FOR SEEDLINGS

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An old, effective medium for germinating seeds is simply adding one pound of 5-10-5 to a three or four cubic foot bag of vermiculite. One can even grow passable fast growing bedding plants for sale in this mix.

Of course, it does cost a bit more than a peat-vermiculite mix and, depending on the 5-10-5 formulation, problems may arise. Some 5-10-5 formulations contain only highly soluble ammonium nitrogen. Others may contain too little calcium to sustain growth beyond the transplant stage.

When Dr. Mehlquist mentioned this procedure to a class, one student questioned if it would work with African vermiculite. With increasing sales of African and periodic unavailability of domestic vermiculite, this is a serious concern.

An experiment was set up using 1 lb. 5-10-5/4 cu. ft. (4 g/l) in vermiculites from both sources. Other pots contained no fertilizer. Five kinds of seeds were sown. The analyses of some vermiculites are as follows:

Table 1--Analyses of African and Domestic Vermiculites

	Soluble							
	pH	Salts	Ca	Mg	K	P	NO ₃	NH ₄

Spurway Analysis, Univ. of Conn. (ppm extract)

Domestic #1	6.3	10	5	0.5	6	0.1	0	2
Domestic #2	7.8	10	5	0.5	1	0.1	0	4
Domestic #3	7.6	10	15	1	10	0.1	0	0
African #1	9.3	10	15	4	10	0.1	0	0
African #2	9.6	10	20	12	11	0.10	0	0
African #3	9.7	10	10	12	5	0.1	0	0

Morgan Analysis, Univ. of Conn. (mg/g)

Domestic #3	7.6	10	1435	240	335	120	--	--
African #1	9.3	10	1000	3125	300	150	--	--
African #2	9.6	10	3532	5298	397	132	--	--

"Available Nutrients," Rutgers University, (ppm)*

Domestic	6.4-6.5	--	1000	600	350	20	Tr	--
African	9.9-10.1	--	200	2825	370	15	Tr	--

*Flannery, R.L., B.L. Pollack and G.A. Taylor. 1975. A growing mix and fertilizer treatments suggested for vegetable bedding plant growers in New Jersey. Rutgers Univ. Leaflet 519. 4 p.

These analyses are in agreement with the literature. Looking at the UConn Morgan and Rutgers data, the calcium:magnesium ratios differ considerably in African versus domestic vermiculite.

Table 2--Calcium:magnesium Ratios in Vermiculite

UConn Morgan	Domestic #3	6:1
	African #1	1:3
	African #2	1:2
Rutgers	Domestic	2:1
	African	1:14

Magnesium and calcium are "earth metals." They both have a valence of two and are adjacent to one another in the periodic chart. Plants cannot differentiate between them readily. Therefore if the concentration of one ion is excessive in relation to the other, the plant is not able to absorb the correct balance of nutrients.

In soil tests (Spurway), it is generally suggested that the Ca:Mg ratio be between 3:1 and 10:1 for good growth. Therefore, if magnesium is especially high, a great deal of calcium must be added to keep the Ca:Mg ratio above 3:1 in order to avoid Ca insufficiency. Likewise, if calcium is too high (the Ca:Mg ratio is above 10:1), magnesium insufficiency or deficiency may occur.

The high magnesium level is not the only problem in African vermiculite. A pH of nearly 10.0 is far beyond the range within which plants grow best. In normal use where it is mixed with soil or sphagnum peat the alkalinity is neutralized. But in this use for seedlings, only the fertilizer is reacting. In two tests the African vermiculite with fertilizer decreased in pH to 8.6 and 8.8 after several weeks of growing, probably due to the fertilizer and leaching.

Seedlings germinated well in all treatments. Fine seed such as petunia stopped growing in African vermiculite soon after germination, (Fig. 1) and even with 5-10-5 the petunias were stunted and chlorotic (Fig. 2). Snapdragon seedlings grew much the same (Fig. 3). They did show greater growth in response to domestic vermiculite (Fig. 4) than other seedlings although alyssum (Fig. 5) was nearly the same.

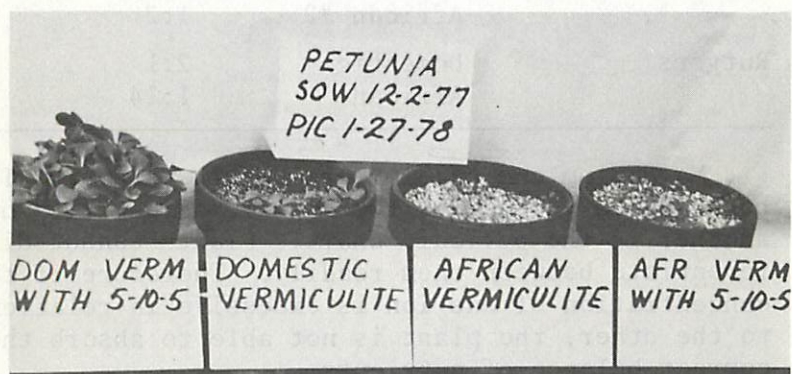


Figure 1.

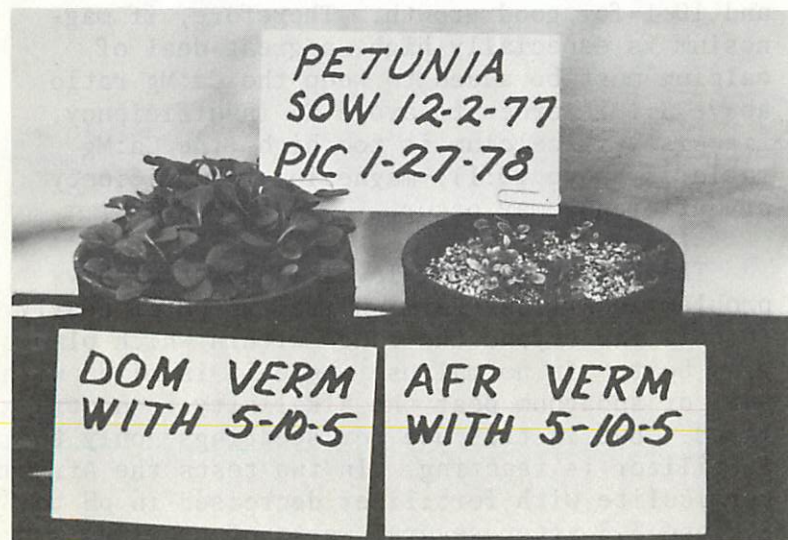


Figure 2.

Marigolds grew rather well in African vermiculite with 5-10-5 but apparently have enough food reserves in the seed to produce a nearly transplantable seedling without fertilizer (Fig. 6). Even so, the seedlings in domestic vermiculite with 5-10-5 were more vigorous.

Tomatoes started well in all treatments probably because they have substantial food reserves in the seeds. But they soon became

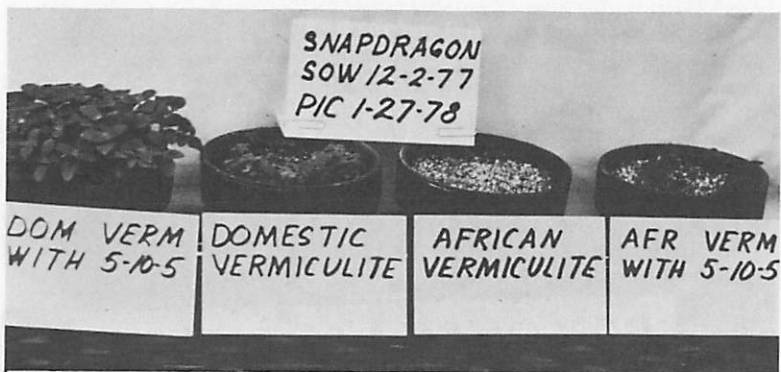


Figure 3.



Figure 4.

stunted and chlorotic (Fig. 7). The difference between the African and domestic vermiculites was less pronounced but was still significant.

In other studies, chrysanthemums grown in peat-vermiculite media amended with dolomitic limestone and 0-20-0 superphosphate showed no adverse effects from African vermiculite when compared with domestic. The two mixes produced comparable plants (Fig. 8).

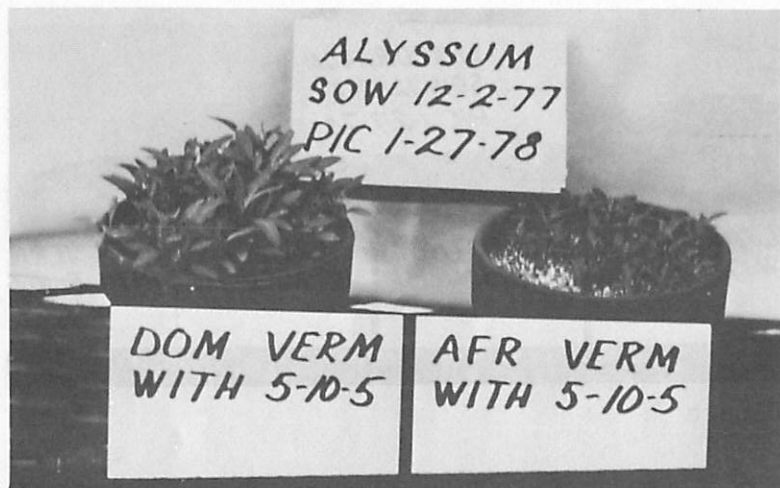


Figure 5.



Figure 6.

It is concluded that African vermiculite is not detrimental when used with soil or sphagnum peat moss. It is logical, however, to consider the use of calcitic limestone in place of dolomitic limestone when African vermiculite comprises a substantial proportion of the mix.

For seeds sown in vermiculite and 5-10-5, make certain that the vermiculite is domestic, not African.



Figure 7.



Figure 8. Chrysanthemum 'Bright Golden Anne' grown in peat-African vermiculite, Pro-Mix B, peat-domestic vermiculite, and 3-2-1 soil mix. All plants were comparable and of acceptable commercial quality.