Sexual Propagation: Effects of Growing Medium on Seed Germination and Seedling Performance

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Introduction to Treatments Used

The treatments used in this lab are the different growing media where the seeds were planted. We used 6 standard media, and 1 custom made medium.

1. Field Soil
2. Perlite
3. Peat Moss
4. Sand
5. Coir (Coconut Husk)
6. Rock Wool
7. Group Mix ($\frac{1}{3}$ each of Field Soil, Peat Moss, Perlite)

Plant material

Tagetes sp. (Marigold; Asteraceae, Aster/Sunflower Family)

Results

Here are the results and observations for this experiment, sorted by week:

- **February 16, 2006** - Lots of very new shoots. Most of the shoots appear healthy and well-formed, but some are showing signs of mineral deficiencies. 8/12 seeds have germinated in the field soil, 6/12 in the perlite, 2/12 in the peat moss, 3/12 in the sand, 9/12 in the coir, 6/12 in the rock woll, 7/12 in the group mix. Overall, 41/72, or 57% of the seeds have germinated.

- **February 23, 2006** - More new shoots, and many new leaves have developed on the existing plants. The seedlings growing the the perlite and sand are showing signs of yellowing, and do not look very healthy. Some weeds have sprouted in the field soil pots, which we have removed. Totals for this week include: 10/12 in the field soil, 9/12 in the perlite, 6/12 in the peat moss, 4/12 in the sand, 11/12 in the coir, 8/12 in the rock wool, and 9/12 in the group mix. Overall totals are 57/72, or 79% germination.

- **March 3, 2006** - Only two more seedlings have germinated since last week, in the perlite and peat moss categories. The seedlings in the sand appear to have stopped growing, and are stuck at 0.5" tall. More weeds in the group mix and the field soil have been removed. This week's totals are: 10/12 in the field soil, 10/12 in the perlite, 7/12 in the peat moss, 4/12 in the sand, 11/12 in the coir, 8/12 in the rock wool, and 9/12 in the group mix. Overall totals are 59/72, or 82% germination.

- **March 9, 2006** - Four new seedlings this week, in the peat moss, coir, rock wool, and group mix. The plants planted in the sand are looking very dismal, one has even dropped a leaf, which we removed. The perlite plants are yellowing, which is an indication of a mineral deficiency. This makes sense, because perlite is usually relatively clean and sterile, and helps stop fungus and other infections from affecting roots. This feature doesn't allow for many minerals to be present, but water is usually held well by perlite. Totals include: 10/12 in field soil, 10/12 in perlite, 8/12 in peat moss, 4/12 in sand, 12/12 in coir, 9/12 in rock wool, 10/12 in the group mix. The final, overall total is 63/72 seeds germinated, which is 87.5%.

Tables

Germination Statistics and Seedling Ratings			
	Seeds Germinated	Germination Percent	Seedling Ratings
Field Soil	10/12	83%	1
Perlite	10/12	83%	4
Peat Moss	8/12	67%	3
Sand	4/12	33%	5
Coir	12/12	100%	2
Rock Wool	9/12	75%	2
Group Mix	10/12	83%	1

The germination criteria used in this lab was simply the presence of a visible shoot. Percentages were calculated based on the planting of 12 seeds per medium, split between three pots. Seedling Ratings were based on the following three criteria:

- **Seedling Height** - The vertical distance above the soil that the shoot reached.
- **Seedling Color** - The appearance of health, and the lack of shrivled or burnt leaves.
- **Size of Leaves** - The surface area of the seedling's leaves.

Discussion

Overall, the different growing media appeared to have a significant effect on both the germination numbers as well as seedling health of Marigold plants. More traditional media such as field soil and the group mix, which was very similar to professional mix, were very successfull media for the germinating seeds. Mineral-bare media such as perlite and sand had a very hard time supporting a healthy seedling, due to that lack of minerals. The perlite was successful with germinating the seeds, so perhaps if perlite is used for germination, the seedlings should be transplanted into a different medium before too long. The rock wool, which was a lightweight, stringy substance, provided ample air and oxygen, helping 9/12 seeds to germinate, and did a good job of supporting the growing shoots. The real star was the coir, which had an impressive 100% germination rate, as well as some of the best looking seedlings. The seedlings planted in the field soil and group mix were taller, greener, and had wider leaves than all the other plants. Our earlier

readings about the porosity of various growing media matched our findings in this experiment. This is what we expected to happen. For example, we knew that perlite added air gaps and held water very well, which is why we added it to the relatively thick field soil. We added the peat moss to our mixture to add minerals and more water retension. This combination of media allowed for some of the best looking seedlings in the experiment. If we were to repeat this experiment, next time I'd like to use more seeds, to provide more accuracy, I'd also like to test all the available media.

Recommendation

For germinating Marigold seeds, the most effective growing medium was the coir fibers.