Effect of Soilless Potting Media and Water Management on Development of Fungus Gnats (Diptera: Sciaridae) and Plant Growth

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Abstract. **Coconut coir dust is being marketed as a soilless medium substitute for sphagnum peat moss that inhibits fungus gnat (*Bradysia* sp.) development. However, little information is available on the effects of coconut coir dust on *Bradysia* sp. In a laboratory study we examined the effect of substituting coconut coir dust for peat moss, with or without a food source, on the development of fungus gnats. An average of less than one adult emerged when 20 fungus gnat eggs were provided with pure or sterilized peat moss or coconut coir. A significantly higher number of adults (11.5–13) emerged when a food source of 1 g of yeast was added to either soilless potting medium type. The adults required up to 10 fewer days to emerge when food was provided, compared to sterilized and pure media, except for the pure peat moss. In a greenhouse study examining the effects of coir and peat at different textures and different moisture levels on fungus gnat survival, there were significant differences at the different levels of moisture. There was a higher population of larvae in the coarse medium containing peat. In the coir-based media, the fine-textured medium had the highest population level of fungus gnats. There were no significant effects on fungus gnat populations among the different levels of moisture within a medium type. However, there was a tendency for lower populations in the most moist and the driest media and the highest survival in the media that were maintained at 52.5% moisture. Plant growth was best in the media with the lowest number of fungus gnats (coarse coconut coir dust-based and fine and medium peat-based media). These results suggest that it is possible to select growing media that minimize fungus gnat populations, while optimizing plant growth. However, contrary to claims made by growing media producers, coconut coir dust does not necessarily inhibit fungus gnat development.**

Fungus gnats are pests of greenhouse pot-plant production, especially in the first weeks after planting. They cause direct damage to plants when the larvae feed on roots of young seedlings (Hamlen and Mead, 1979; Hungerford, 1916). Five to 10 larvae per pot-grown plant are considered a moderate infestation (Hamlen and Mead, 1979). However, for seedling plants, thresholds may have to be lowered because young plants are more susceptible to larval feeding. Indirect damage also can occur when larval feeding predisposes the plant to attack by pathogens, and when adults disseminate pathogens among plants (Harris et al., 1994; Jarvis et al., 1993; Kalb and Millar, 1986). Greenhouse managers rely on insecticides to manage fungus gnat infestations (Hamlen and Mead 1979; Lindquist et al., 1985). Nonchemical control methods have been researched as an alternative to the exclusive reliance on chemical insecticides. Screening greenhouse openings, attractant light traps, and layering sand over the top of the growing medium all can reduce fungus gnat infestations (Harris et al., 1996). Biological control agents, such as pathogenic bacteria (Osborne et al., 1985), predaceous mites (Gillespie and Quiring, 1990; Wright and Chambers, 1994), parasitic nematodes (Harris et al., 1995; Hudson, 1974; Poinar, 1965), and hymenopterans (Harris et al., 1996) have potential in a fungus gnat management program.

Many greenhouse pot-plant producers have experienced an increase in fungus gnat population levels during recent years (author's observations). This may be due to insecticide resistance (Lindquist et al., 1985) or to the introduction of new types of soilless potting media that may already have fungus gnats. Sphagnum peat moss is used in the pot-plant industry because it has many desirable characteristics, including high water-holding capacity, good aeration properties, and resistance to decomposition (Stamps and Evans, 1997). However, sphagnum peat moss is difficult to rewet after drying out and it provides a suitable environment for the development of fungus gnats (Knauss, 1996). Fungus gnat larvae are primarily fungal feeders (Anas and Reeleder, 1988; Gardiner et al., 1990; Kennedy, 1974), and they will feed on plant tissues in the absence of a fungal food source. Fungus gnats appear to prefer soilless media containing peat moss with abundant moisture (Baker, 1994). Under abundant moisture conditions, soilless potting media appear to provide a higher level of fungal activity to support fungus gnat development (author's observations). Reducing fungal activity may potentially reduce fungus gnat infestations in greenhouse pot-plant production. Fungus gnat larvae feed in the upper centimeters of the growing medium. Allowing this portion of the medium to dry before resaturation may reduce fungal activity, and therefore fungus gnat infestations (Baker, 1994).

Although sphagnum peat moss is the most widely used soilless medium component in the pot-plant industry, alternative potting media are being investigated. Coconut coir dust, a by-product of the mesocarp of the coconut (*Cocos nucifera* L.) fruit, is being marketed as a substitute for sphagnum peat moss, with similar physical characteristics (Evans et al., 1996; Meerow, 1994, 1995). Coconut coir dust has been marketed as a soilless potting medium component that inhibits fungus gnat development. However, little information is available regarding the development of fungus gnats in this soilless medium (Evans et al., 1998).

In laboratory and greenhouse studies we examined the effect of coconut coir dust vs. peat moss on fungus gnat development, and evaluated the impact of peat vs. coconut coir dust on fungus gnat survival in potting media of different textures and levels of moisture. In addition, in the greenhouse study we determined how different moisture levels and growing media affected the growth of chrysanthemum (*Chrysanthemum* ×*morifolium* Ramat.).

Materials and Methods

A preliminary study was conducted to determine whether coconut coir dust vs. sphagnum peat moss has an effect on the development of fungus gnats. In a constant temperature (22 °C) study, pure coir, sterilized coir, and coir plus 1 g of yeast (added as a food source) were compared with pure peat, sterilized peat, and peat plus 1 g of yeast for fungus gnat larvae. The sterilized peat moss and coco-

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nut coir were sterilized for 1 h in an autoclave.

Styrofoam cups (312 g) were filled with 200 mL of medium that was lightly wetted. A 0.005-mm camel hair brush was used to place 20 fungus gnat eggs on top of the medium in each cup. Eggs were taken from a second-generation fungus gnat laboratory colony. One end of a paper clip (#1) was inserted through a 5.1-cm^2 yellow sticky card (Olson Products Inc., Medina, Ohio) and the other end to the bottom of the cup lid. When the lid was attached to the cup, the sticky card hung about 1.3 cm above the medium. The treatment cups were placed in a growth chamber (22 °C, photoperiod of 12 h) for a duration of 30 d.

The number of emerged adults were counted on each sticky card daily beginning 15 d post egg introduction for 14 consecutive days. The cards were cleaned and returned to the hanging position in the cups each day.

The experimental treatments were arranged in a randomized complete-block (RCB) design. The treatments were initiated at three different start times (five replications per start time for a total of 15 replications) to facilitate data collection each day. Adult fungus gnat emergence was compared by analysis of variance (ANOVA) using SAS General Linear Model (PROC GLM). Mean separation was performed using the DUNCAN test at the $P \leq 0.05$ level (SAS Institute, 1990).

A second study was conducted to evaluate the impact of sphagnum peat moss vs. coconut coir dust on fungus gnat survival in potting media of different textures and moisture levels. Fine (MetroMix Redi-Earth; Scotts Co., Marysville, Ohio), medium (MetroMix 366), and coarse (MetroMix 510) texture media, each formulated with either peat or coconut coir dust, were tested. Composition of the media is summarized in Table 1. Each of these media was tested at different levels of moisture. Treatments allowed the media to dry and were watered to saturation when the remaining moisture level reached 90%, 71.2%, 52.5%, 34%, or 15% of saturation. Ninety percent moisture level was considered near saturation and 15% was the initiation of plant wilting.

Pots (15 cm, round) were filled to the inner rim, 2.5 cm from the top, with potting medium. Individual treatment pots were weighed using a laboratory bench top scale (Ohaus model LS200; Ohaus Scale Corp., Florharm Park, N.J.) with the dry medium in them. Pots were then watered to saturation and the excess water was allowed to drain until dripping ceased before weighing a second time. Any increase in weight is the free moisture in that potting medium. The weights of all the pots within a medium were adjusted by adding/subtracting saturated media until they all weighed the same. In adjusting this weight, the weight of a single rooted chrysanthemum plant, planted into each individual plot, was added. The target weight for each moisture level was then determined by subtracting the weight of the appropriate percentage of moisture loss (90% moisture level = 10% moisture loss, etc.) from the target weight of the medium. Each medium had a different target weight determined by the amount of free moisture in the medium and the weight of the pot at the beginning of the experiment.

Fungus gnat eggs were applied to the surface of the potting medium at the central portion of the pot. Fungus gnat eggs were suspended in water by swirling a flask containing eggs in water and a pipet was used to remove an appropriate amount of water + eggs to deliver ≈50 eggs per pot. The soilless medium in all treatment pots was then brought to saturation and the experiment began the following day. Individual treatment pots were weighed daily. When they reached their target weight, they were watered until saturated by placing the pots in a flat of water and then replaced on the greenhouse bench.

Fungus gnat populations were estimated by placing a 2.5-cm-diameter potato disk on the medium surface, 17 d post egg introduction, for 3 d and counting the larvae under the potato disk each day (Harris et al., 1995). Adults were collected by enclosing the pot in a fabric potting sleeve (Fibe-Air Kleen Test Products, Brown Deer, Wis.) with two yellow sticky cards (3.5 × 6 cm), one placed near the medium surface and the other just above the top of the plant. Two clip pins were used to securely close the top of the potting sleeve. The pots were enclosed in the sleeves 20 d post egg introduction and left enclosed for 7 d to allow for adult fungus gnat emergence.

When all fungus gnat data were collected, 32 to 34 d after the start of the experiment, all pots were watered to saturation and stomatal conductance of the plants was measured at 1, 3, and 5 d after the plants had been watered, using a steady-state porometer (LI-1600; LI-COR, Lincoln, Nebr.). At the end of the experiment, leaf area, plant height, number of nodes, and leaf and stem dry weight were recorded. Internode length was calculated as the plant height divided by the number of nodes. Root systems of half the plants (one plant per experimental unit) were washed to determine root dry weight.

Each treatment contained two pots with treatments arranged in a RCB design. The experimental treatments were initiated at three different start times (two replications per start time for a total of six replications) to facilitate the large number of pots to be weighed each day. The population estimates for larval and adult fungus gnats and plant characteristics were compared by a three-way ANOVA using SAS PROC GLM to determine plant growth and fungus gnat survival in each medium, texture, and moisture condition. Mean separations were computed using the DUNCAN test at the $P \leq 0.05$ level (PROC GLM, SAS Institute, 1990). To stabilize the variance, fungus gnat data were square-root transformed before analysis.

Results

There was no direct effect of coir or peat in the study that looked at the effect of substituting coconut coir for sphagnum peat moss on the development of fungus gnats.

Very few adults (<1) emerged from the sterilized and nonsterilized media with either coconut coir dust or peat moss only (Table 2). A food source did have a direct effect on fungus gnat development. A significantly ($P = 0.001$) higher number of adults were captured when 1 g of yeast was added to either soilless potting medium (Table 2). The developmental time, from egg to adult, was significantly ($P = 0.0001$) shorter when food was provided compared to sterilized and nonsterilized media, except when compared to unsterilized peat moss (Table 2). The adults emerged in almost 18 d from coconut coir dust plus yeast and in slightly more than 19 d from peat plus yeast, up to 10 fewer days compared to when no food was provided.

In the study looking at peat moss and coconut coir dust and components of different textures and moisture levels, a significantly ($P = 0.004$) higher number of larvae developed in peat moss as compared to coconut coir. There was a highly significant texture × potting medium composition ($P = 0.0001$) interaction effect on larval development. When coir was used with Redi-Earth (fine texture) (Table 1), more larvae developed than in Redi-Earth with peat (Table 3). In contrast, when coir was used with either MetroMix 366 (medium texture) or 510 (coarse texture) fungus gnat survival was significantly less than in comparable media containing peat. A significantly higher number of larvae developed in the coarse-textured treatments followed by the medium texture when peat moss was used (Table 3).

Table 1. Composition of the commercial growing media used in the study.

Medium	Texture	Sphagnum peat or coconut coir[z]	Vermiculite	Bark ash	Pine bark
		%			
Redi-Earth	Fine	35–45	55–65	0	0
MetroMix 366	Medium	35–50	30–40	0–5	15–30
MetroMix 510	Coarse	20–35	15–30	5–25	20–45

[z]Coir-based media contained coconut coir instead of sphagnum peat. All media also contained lime and a starter nutrient charge.

Table 2. Effect of soilless potting media, with and without a food source (yeast), on adult fungus gnat emergence. Data represent the mean of 15 replications.

Treatment	No. of emerged adults	Time to emergence (days)
Coir pith, sterile	0.4 b[z]	23.3 c
Coir pith	0.1 b	28.0 a
Coir pith + yeast	11.5 a	17.9 d
Peat moss, sterile	0.2 b	25.7 b
Peat moss	0.7 b	17.7 d
Peat moss + yeast	12.9 a	19.3 d

[z]Means followed by the same letter are not significantly different ($P = 0.05$).

Among the different potting media at the various moisture levels, there were significant ($P = 0.02$) interaction effects on larval development. Significantly more fungus gnat larvae were sampled from peat-based media than from comparable coir-based media when they were maintained at 71.2% or 52.5% moisture (Table 3). There were no significant differences in larval populations among peat- and coir-based media when they were maintained at the wettest (90%) or lower moisture levels (34% and 15%). Among the different levels of moisture within a medium, there was a tendency for larval population levels to be lower in the wettest and driest soilless potting media (Table 3). The medium composition × texture × water interaction did not significantly ($P = 0.4$) affect larval development.

Fungus gnat adult populations followed similar trends as the larval populations (Table 4). When the two soilless potting media were compared, the adult population was significantly ($P = 0.0001$) larger with sphagnum peat moss than with coconut coir. There was a highly significant texture × potting medium composition ($P = 0.0001$) interaction effect on adult emergence. A significantly higher number of adults emerged from the coarse-textured treatments followed by the medium texture when peat moss was used (Table 4). When coir was used, adult emergence was higher, although not significantly, with Redi-Earth (fine texture) (Table 1) compared to MetroMix 366 (medium texture), or MetroMix 510 (coarse texture). Adult emergence was significantly lower in the pure coir compared to Redi-Earth with coir. There were no significant ($P = 0.50$) interaction effects on adult emergence among the different potting media at the various moisture levels. Adult emergence tended to be lower in the wettest and driest media for the sphagnum peat moss compared to the coir media, but these differences were not statistically significant (results not shown). The texture × moisture and medium × texture × water interactions did not significantly ($P = 0.88$) affect adult emergence.

Although both moisture level and growing medium composition affected plant growth, there were no significant interactions between them and their effects are discussed separately. The effects of watering regime on plant growth were generally small (Table 5). Only the lowest moisture level (15% before rewatering) significantly reduced root dry weight (by 18%, $P = 0.044$) and plant height (by 9%, $P = 0.002$) as compared with plants grown with a 90% moisture level. The different moisture levels had no effect on the stomatal conductance after all plants had been rewatered ($P = 0.36$), but plants grown in pure peat consistently had a lower stomatal conductance than plants grown in the other media ($P < 0.0001$).

The different growing media had large effects on plant growth ($P < 0.0001$) (Table 6). Shoot and root dry weight, leaf area, and plant height were highest in the coarse coir-based growing medium, followed by the medium- and fine-textured peat-based media. Growth generally was poorest in pure peat. Differences in root dry weight generally were smaller than those in shoot dry weight, leaf area, and plant height, with the exception of the plants grown in pure peat.

Table 3. Effect of soilless potting media and water management on the development of fungus gnat larvae. Plants were grown in either pure peat or coir, or in a commercially available growing medium, made with either sphagnum peat or coconut coir. Media of three different textures were used: fine (Redi-Earth), medium (MetroMix 366), and coarse (MetroMix 510). Data represent the mean of six replications.

	No. of fungus gnat larvae				
Interactive effects		Pure	Fine	Medium	Coarse
Composition × texture					
Peat		4.6 Ac[z]	5.3 Bc	11.7 Ab	18.4 Aa
Coir		0.8 Bb	18.1 Aa	2.0 Bb	0.7 Bb
Composition × moisture	90%	71.2%	52.5 %	34%	15%
Peat	7.4 Ab	15.8 Aa	16.2 Aa	8.0 Ab	2.6 Ab
Coir	7.7 Aa	4.3 Ba	5.1 Ba	6.2 Aa	3.7 Aa

[z]Means followed by the same letter are not significantly different ($P = 0.05$); uppercase letters are to compare means within a column; lowercase letters are for means within a row. Composition × texture interaction ($P = 0.0001$), and composition × moisture interaction ($P = 0.02$) were statistically significant, while the texture × moisture and composition × texture × moisture interactions were not statistically significant.

Table 4. Effect of soilless potting media and water management on fungus gnat adult emergence. Plants were grown in either pure peat or coir, or in a commercially available growing medium, made with either sphagnum peat or coconut coir. Media of three different textures were used: fine (Redi-Earth), medium (MetroMix 366), and coarse (MetroMix 510). Data represent the mean of six replications.

Composition × texture interaction	Pure	Fine	Medium	Coarse
	No. of fungus gnat larvae			
Peat	5.3 b[z]	1.0 b	4.3 b	35.3 a
Coir	0.45 b	6.7 a	1.6 ab	2.1 ab

[z]Means followed by the same letter are not significantly different ($P = 0.05$); lower case letters separate means within a row. Composition × texture ($P = 0.0001$) effects were statistically significant; moisture, composition × moisture, texture × moisture, and composition × texture × moisture were not.

Table 5. Effect of watering treatments on the dry weight (DW) and other growth characteristics of chrysanthemum. Pots were irrigated when the medium moisture level dropped below the target moisture level.

Moisture level (%)	Shoot DW (g/plant)	Root DW (g/plant)	Leaf area (cm^2/plant)	Plant height (cm)	No. of nodes	Internode length (cm)
90	1.02 a[z]	0.80 a	120 a	11.7 a	15.5 a	0.75 a
71.2	1.02 a	0.74 a	122 a	11.6 a	15.8 a	0.73 a
52.5	1.07 a	0.80 a	124 a	11.4 a	15.2 a	0.74 a
34	1.00 a	0.73 ab	122 a	11.2 a	15.2 a	0.73 a
15	0.90 a	0.66 b	115 a	10.6 b	15.0 a	0.70 a

[z]Means within a column followed by the same letter are not significantly different ($P = 0.05$).

Table 6. Effect of different growing media on the dry weight (DW) and other growth characteristics of chrysanthemum. Plants were grown in either pure peat or coir, or in a commercially available growing medium, made with either sphagnum peat or coconut coir. Media of three different textures were used: fine (Redi-Earth), medium (MetroMix 366), and coarse (MetroMix 510).

Growing medium	Texture	Shoot DW (g/plant)	Root DW (g/plant)	Leaf area (cm^2/plant)	Plant height (cm)	No. of nodes	Height/node (cm)
Peat-based	Pure	0.44 e[z]	0.15 e	32 f	5.9 f	8.0 e	0.74 c
	Fine	1.35 b	0.97 ab	152 c	13.8 b	17.1 b	0.81 ab
	Medium	1.39 b	0.84 bc	177 b	14.6 b	18.4 a	0.80 b
	Coarse	0.92 c	0.63 d	119 d	11.5 c	16.4 bc	0.70 cd
Coir-based	Pure	0.70 d	0.73 cd	78 e	7.5 e	12.2 d	0.61 f
	Fine	0.81 cd	0.74 cd	105 d	10.2 d	16.0 c	0.65 ef
	Medium	0.87 c	0.79 c	105 d	11.0 c	16.0 c	0.68 de
	Coarse	1.57 a	1.10 a	195 a	15.9 a	18.8 a	0.85 a

[z]Means within a column followed by the same letter are not significantly different ($P = 0.05$).

Discussion

Coconut coir dust is being marketed as a substitute soilless pot-plant medium component for sphagnum peat moss because it appears to be a suitable alternative for the pot-plant industry (Evans and Stamps, 1996; Lokesha et al., 1988; Talukdar and Barooah, 1987). Coir dust has suitable uniform physical and chemical properties, is available in sufficient quantities, and is economically competitive with sphagnum peat moss, the most widely used soilless medium component in the pot-plant industry. Although coconut coir dust has been marketed as a substrate that inhibits fun-

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gus gnat development, very little information is available regarding the impact of coconut coir dust on fungus gnat populations. Evans et al. (1998) demonstrated that fungus gnats survive as well in a coir-based media compared to a peat-based media. They determined fungus gnat development and reproduction in pot-containers of a 80:20 coir : or peat : perlite mixture (by volume), in which a poinsettia (*Euphorbia pulcherrima* Willd. ex Klotzsch) was planted. In our studies we demonstrated the impact of coconut coir dust vs. sphagnum peat moss, with or without a food source, on fungus gnat development and the impact of coconut coir dust vs. sphagnum peat moss on fungus gnat survival in potting media of different textures and at different moisture levels.

There was no direct effect of coir or peat on the development of fungus gnats. In the sterilized and nonsterilized media, for both coir and peat, there was very low (<1) survival of the fungus gnats. This suggests that the larvae cannot survive on just the coir or peat medium. There has to be plant material or fungal growth present as a food source for larval growth and development (Anas and Reeleder, 1988; Kennedy, 1974). When yeast was added as a food source, larval survival was high. Fifty-six percent and 65% of the larvae survived to emerge as adults in the coconut coir dust and peat moss, respectively. Adults emerged in ≈18 or 19 d from coir and peat moss with yeast, respectively, compared with a developmental period of up to 28 d when no food was provided. Our results concur with Evans et al. (1998), who demonstrated that fungus gnats survive and reproduce in both coir- and peat-based media. In addition, we have demonstrated here that an available food source is important for fungus gnat development and survival, while the type of potting medium is less important.

In the study looking at coir and peat and components of different medium textures and at different moisture levels, fungus gnats did develop and survive in coconut coir but at a significantly lower level compared to the peat moss. Among the media, fungus gnats survived best when coir was used with Redi-Earth (fine texture) and when peat moss was used with MetroMix 366 (medium texture) and MetroMix 510 (coarse texture) media. Among the different potting media at the various moisture levels, fungus gnats were less sensitive to the medium texture at higher ranges of moisture in peat moss as compared to the coir media. Among the different levels of moisture there were no significant trends within a medium type. There was a tendency for lower fungus gnat survival in the wettest and the driest media and the highest survival in the media that were maintained at 52.5% moisture. In comparing textures, the larval population was significantly higher in the coarse-textured peat when maintained at 90%, 71.2%, or 52.4% moisture and in the fine-textured coconut coir dust at 90%, 34%, or 15% moisture. Adult fungus gnat emergence was the highest from the coarse-textured peat when maintained at any level of moisture and in the fine-textured coir media at 15% moisture.

Our study did not determine if the commercial media might have been infested with fungus gnat eggs or larvae. If the media had been infested with fungus gnats, larvae and/or adults would have emerged prior to when we infested the individual treatments with eggs. Based on our study, the use of coconut coir in place of sphagnum peat moss, in commercial potting media, may have an impact on fungus gnat development, but not necessarily in all situations. The use of coir as a substitute for peat moss would appear to reduce the chances of fungus gnat problems (except in the fine-textured media) and the need for insecticides or other management measures for fungus gnats.

The relatively small effect of the moisture treatments on plant growth was surprising. Strojny et al. (1998) have shown that a high moisture content in the growing medium can inhibit chrysanthemum growth because of unfavorable atmospheric conditions (low O_2 and high CO_2 and C_2H_4 concentrations) in the growing medium. However, they used a heavy mix of clay loam soil and peat moss, which probably had much less air space than any of the mixes used in our study. Low moisture levels can reduce plant growth because of drought stress, but apparently the lowest moisture content in this study (15%) was not low enough to result in a severe inhibition of growth. That is consistent with our finding that none of the moisture treatments had a lasting effect on the stomatal conductance of the plants. Conductance is important to plant growth because it determines how rapidly CO_2 can diffuse into the leaves, where it is needed for photosynthesis.

Plant height and internode length are important quality characteristics for ornamental plants, because consumers generally prefer compact plants. It has been suggested that low moisture levels can be used to prevent plants from getting too tall (de Graaf-van der Zande, 1990). However, our results suggest that the moisture level of the growing medium has little or no effect on the plant height and internode length of chrysanthemum (Table 5).

Chrysanthemum growth was strongly inhibited by pure peat. Pure peat has a low pH that commonly inhibits plant growth (Bunt, 1988). In addition, the poor growth of plants in pure peat and coconut coir can be attributed partly to the absence of a starter fertilizer and lime in these growing mixes. The other six growing media were prepared following standard procedures and included lime and starter fertilizer. Because plants were not fertilized during this experiment, the absence or presence of fertilizer in the growing medium may have had an important effect on plant growth.

The same media that produced the best plant growth, coarse coconut coir dust-based and medium- and fine-textured peat-based media, also produced the lowest number of fungus gnats. This suggests that it is possible to achieve good plant growth in growing media that will inhibit population buildup of fungus gnats. Despite manufacturers' claims, coconut coir dust-based growing media do not necessarily inhibit fungus gnat development. Evans et al. (1998) also demonstrated this, while our results show that potting medium texture also has an important effect on fungus gnat populations. Buildup of fungus gnat populations can be slowed down by selection of the appropriate growing medium, independent of whether peat or coconut coir is used. However, inhibition of fungus gnats does not depend solely on either growing medium texture or composition, but rather on the combination of these two factors. A coconut coir-based growing medium that inhibits fungus gnat development may lose this quality if the coir is replaced by peat and vice versa.

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