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EFFECT OF DIFFERENT GROWING MEDIA ON THE GROWTH AND FLOWERING OF STOCK (*MATTHIOLA INCANA*) UNDER THE AGRO-CLIMATIC CONDITION OF DERA ISMAIL KHAN

Kashif Waseem*, Adil Hameed, Muhammad Saleem Jilani, Mehwish Kiran, Mamoon-Ur-Rasheed, Ghazanfarullah, Sadaf Javeria and Tehsin Ali Jilani

Faculty of Agriculture, Gomal University, Dera Ismail Khan, KPK, Pakistan
***Corresponding author's e.mail: waseemhort@gmail.com**

A pot experiment was conducted to investigate the effect of different growing media on the growth and development of stock (*Matthiola incana*). Seven different growing media including soil (100%), leaf mold (100%), coconut husk (100%), soil + leaf mold (50:50), soil + coconut husk (50:50), leaf mold + coconut husk (50:50) and soil + leaf mold + coconut husk (33:33:33) were used to check the growth of Stock plants in pots. Data was recorded for different parameters including days to flower initiation, days to flowering, plant height (cm), leaves per plant, branches per plant, flowering clusters per plant, flowers per cluster, flowers per plant and flower persistence life (days), during this course of study. The overall performance of Stock was better in media having leaf mold as it took least days to flower initiation (75.83), maximum plant height (21.43 cm), flowering clusters per plant (4.11), number of flowers per cluster (8.45 days), flowers per plant (34.66). For better growth and flowering of Stock plant, leaf mold can be used as growing media in pots.
Keywords: *Matthiola incana*, leaf mold, coconut husk, potting media, annual flowers clusters

INTRODUCTION

The Stock (*Matthiola incana)* belongs to Brassicaceae family. It is considered one of the most outstanding fragrant cool-season cut flower. Also, it produces spikes of double flowers in shades of magenta, rose, purple, pink and white from basal rosettes of green or silvery leaves. It is mainly used for planting flowerbeds in different types of gardens, and has become an economically important floral crop (Hisamatsu *et al.,* 2000). The fragrant, single or double flowers of common stock bloom in white and shades of pink, red, yellow, and purple. They are wonderful in the flower arrangement. It attains a height of 30 to 60 cm; spread 30 cm.

Good flower production usually depends upon various factors including the type of growing media used. Growing media is defined as the mean where the roots of cultivated plants grow (Kampf, 2000). Their primordial function is to give support for plant growing (Kampf, 2000; Robert, 2000). Nutrients availability plays a pivotal role in good flower production and thus provision of proper growing media is the pre-requisite for better growth and production of floriculture crops. The plant growing medium must be porous for root aeration and drainage and also capable of water and nutrient retention. Oxygen, of course, is required for all living cells. The coarse-textured media often meet these requirements. Mushroom compost, leaf mold, farmyard manure and other amendments may fulfill these requirements. Brundert and Schmidt (1982) stated that plants with higher water requirements grew more vigorously in leaf mold medium. Fernandez (1984) observed that the plant height and leaf development of foliage plants were best in leaf mold medium. Khan and Khan (1991) reported that the bulb of Dahlia was best developed in the leaf mold. Pasini and Aquila (1989) observed maximum plant height and number of leaves in plants grown in leaf mold medium. Shah *et al*. (2006) got maximum leaves (7.0), with maximum length (20 cm), maximum leaf area (84.7cm^2) and maximum roots (15) in *Ficus binnendijki* cutting, when leaf mold was used as potting media.

A good growing medium would provides sufficient anchorage or support to the plant, serves as reservoir for nutrients and water, allow oxygen diffusion to the roots and permit gaseous exchange between the roots and atmosphere outside the root substrate (Argo 1998 and Abad *et al.*, 2002).

This important factor is usually under estimated while working on commercial flower production. Only few studies deal with growing media and their effect in various flowering ornamentals like Lilium (Kapoor *et al.*, 2000), gladiolus (Salim *et al.*, 2002), Crocus (Wazir, 2005), Phlox (Naz *et al*., 2006), Dahlia (Kiran *et al.*, 2007), Freesia (Ali *et al.*, 2011) and tuberose (Ikram *et al.*, 2012). However, no such study has been conducted on Stock (*Matthiola incana*) in general and in D.I. Khan region in particular. The current study is being proposed to study the effect different growing media on growth and development of stock (*Matthiola incana)* plant.

MATERIALS AND METHODS

A pot experiment was conducted to determine the effect of different plant growing media on the growth and development of stock (*Matthilo incana*). The experiment was laid out in Completely Randomized Design (CRD) with 7 treatments and each has three replications. The seeds were sown during October in the nursery. The seedlings when attained a size of 3-4 inches, were transplanted in 9 inches containing the different potting media during November and were irrigated immediately. All the required cultural practices i.e. irrigation, weeding, hoeing were carried out regularly throughout the growing season.

Seven different growing media including T1= soil (100%), T2 = leaf mold (100%), T3 = coconut husk (100%), T4 = soil + leaf mold (50: 50%), T5 = soil + coconut husk (50: 50%), T6 = leaf mold + coconut husk (50: 50%) and T7 = soil + leaf mold + coconut husk (33:33:33) were used to check the growth of Stock plants in pots. Data was recorded for different parameters including days to flower initiation, days to 1st flower emergence, plant height (cm), leaves per plant, branches per plant, flowering clusters per plant, flowers per cluster, flowers per plant, and flower persistence life (days), during this course of study. The data collected was subjected to analysis of variance technique (Steel *et al.*, 1997), while DMR test (Duncan 1955) was adopted to detect the statistical different treatment means.

RESULTS AND DISCUSSION

The significant differences in days to flower initiation in stock plants were observed in response to different growing media. It was noted that (Soil media) took maximum days to flower initiation (87.71), which was followed by T5 (Soil + Coconut Husk) and T3 (Coconut Husk) taking 86.93 & 82.2 days to flower initiation, respectively. All these treatments were statistically similar to each other, as shown in Fig.1. Rest of the treatments including T6 (Leaf mold + Coconut Husk), T4 (Soil + Leaf mold), T7 (Soil + Leaf mold + Coconut Husk) and T2 (Leaf mold) were statistically at par with each other. These results are in line with El-Naggar and El-Nasharty (2009), who also reported early flowering in compost and composted leaves media compared to clay. In a similar study Kiran *et al.* (2007) also recorded significant differences in days to flower initiation in Dahlia.

The results depicted significant differences among different treatment for days to flowering. Maximum days (12.86) to 1st flower emergence were recorded in T1 (control) followed by T6 (Leaf mold + Coconut Husk) and T7 (Soil + Leaf mold + Coconut Husk) which took 12.15 and 11.93 days to 1st flower emergence, respectively (Fig. 1). All these treatments were statistically at par with each other. Intermediate results were recorded in T2 (Leaf mold), T3 (Coconut husk) and T5 (Soil + Coconut husk) with 11.22, 11.16 and 10.46 days to 1st flower emergence, respectively and these were at par with each other. Minimum days (8.75) for this trait were observed in T4 (Soil + Leaf mold). Similar results were reported by Riaz *et al.* (2008) who also reported significant variations for days to 1st flower emergence in *Zinnia elegans* cv. Blue point. Similarly, Khan *et al.* (2002) also showed significant variation in days to 1st flower emergence in *Gladiolus hortulanus* cv. Jacksonville Gold.

Significant maximum plant height (21.43 cm) was recorded in T2 (leaf mold), very closely followed by T5 (Soil + Coconut Husk) with 20.53 cm long plants and both the

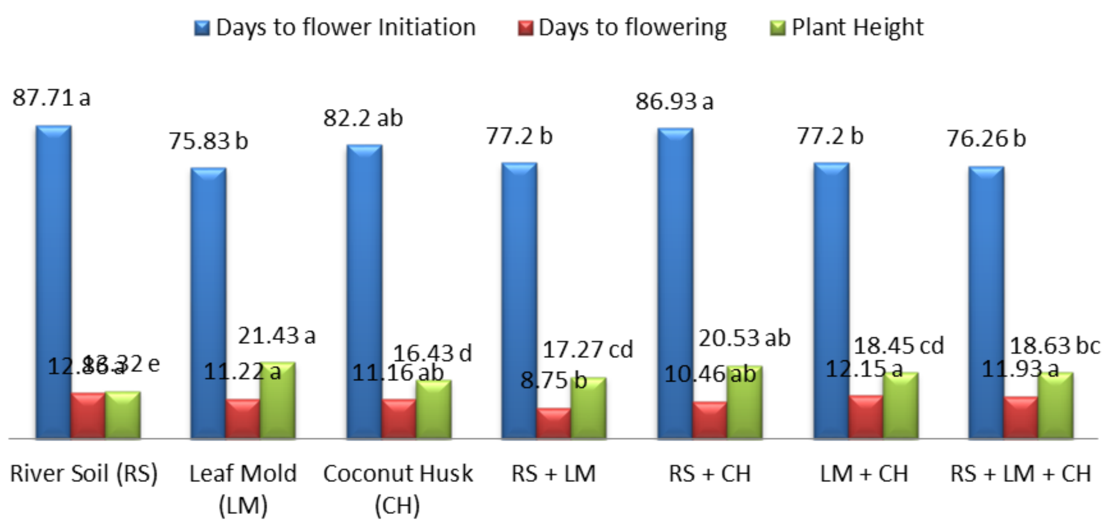

Figure 1. Days to flower initiation, flowering and plant height (cm) of stock as affected by different growing media

treatments were statistically at par to each other. Statistically similar results were also observed in T7 (Soil + Leaf mold + Coconut Husk), T6 (Leaf mold + Coconut Husk) and T4 (Soil + Leaf mold), which took 18.63, 18.45 and 17.27 cm plant height, respectively (Fig. 1). The minimum plant height (13.32 cm) was recorded in T1 (Soil). The reason for taking minimum plant height by T1 might be due to the non-availability of nutrients to the plants, required for their better vegetative growth and vice versa. The results showed that the availability of proper nutrients to the plants may alter the plant height as Younas *et al.* (2008) also obtained maximum plant height of *Dahlia coccinia* on leaf manure. Similar results have been reported by Riaz *et al.* (2008) who reported vigorous plant height in *Zinnia elegans* cv. Blue point, when Leaf manure mixture was used as a growing media. The reason for this might be the adequate amount of nitrogen, potassium and organic matter content in mushroom compost and leaf mold, which positively contributed towards the plant height (Ali *et al.*, 2011).

Significant differences were revealed for number of leaves per plant among different treatments. Maximum leaves per plant (69.61) were recorded in T7 (Soil + Leaf mold + Coconut Husk) very closely followed by T6 (Leaf mold + Coconut Husk) with 64.66 leaves per plant. The treatment means recorded for Coconut Husk (41.76) and leaf mold (40.83) were statistically similar. The lowest number of leaves per plant was observed in control (29.10), as shown in Fig.2. Our results showed that combined effect of Soil + Leaf mold + Coconut Husk resulted in more number of leaves. Our findings get support from the previous work done by Wuryaningsih *et al.* (1999) who also obtained significant increase in pot anthurium leaf number while using coir dust as growing media. Similarly, Pasini and Aquila (1989) and Riaz *et al.* (2008) obtained maximum number of leaves per plant on leaf manure media for different floricultural crops. Our results and previous findings showed that leaf mold played an important role in producing maximum number of leaves because leaf mold contained rotten plant residues and had more organic matter and humus in which nutrients are available for plant growth.

A significant and varying response of different treatments was displayed for the number of branches per plant. Maximum branches per plant (9.05) were recorded in T6 (Leaf mold + Coconut Husk) very closely followed by 8.98 and 6.33 branches per plant in T7 (Soil + Leaf mold + Coconut Husk) and T2 (Leaf mold) respectively and all these treatments were statistically at par. Statistically similar results were recorded in T5 (Soil + Coconut Husk), T4 (Soil + Leaf mold) and T2 (Leaf mold) with 5.55, 4.77 and 4.55 branches per plant, respectively. The least number of branches per plant (2.38) was recorded in T1 (soil). This trait also showed a positive correlation with the number of leaves per plant as same treatments yielded maximum number of leaves per plant. The results once again showed that the presence of Leaf mold in the growing media enhanced the growth of stock plant. Our results got support from the previous findings of Riaz *et al.* (2008) who also found significant variations in number of branches in *Zinnia elegans* cv. Blue point using leaf manure.

Maximum flowering clusters per plant (4.11) were recorded in T2 (leaf mold) very closely followed by T6 (Leaf mold + Coconut Husk) and T4 (Soil + Leaf mold) producing 3.66 and 3.22 flowering clusters per plant, respectively and all these treatments were statistically akin (Fig. 2). Statistically similar results were also observed for T7 (Soil + Leaf mold + Coconut Husk), T1 (Soil) and T5 (Soil + Coconut Husk)

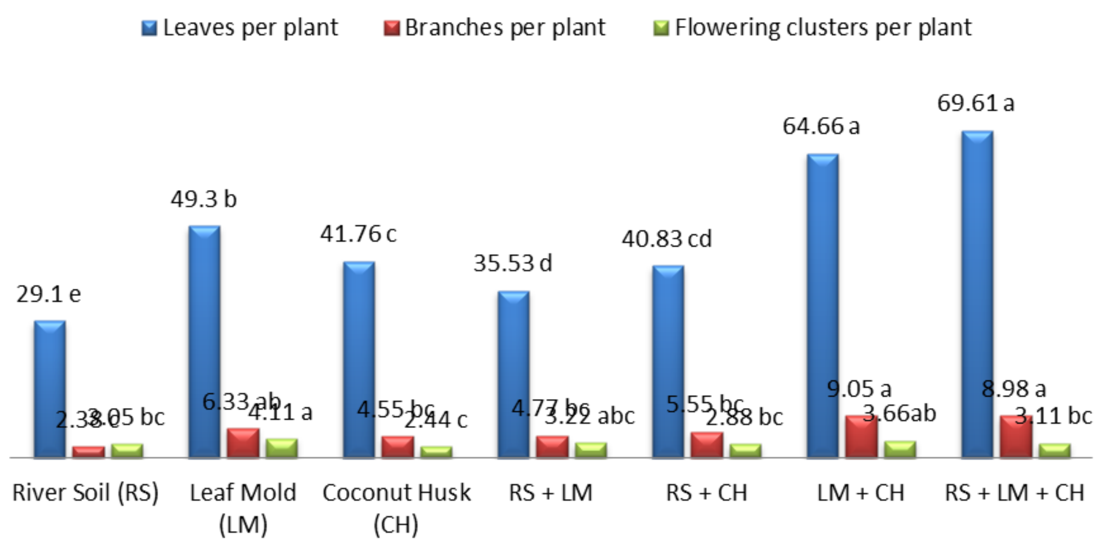

Figure 2. Leaves, branches and flowering clusters per plant of stock as affected by different growing media

producing 3.11, 3.05 and 2.88 flowering clusters per plant, respectively. The minimum flowering cluster per plant (2.44) was recorded for T3 (Coconut Husk). This result once again showed that the presence of Leaf mold in the growing media encouraged the flowering clusters.

The results showed that statistically maximum flowers per cluster (8.45 and 8.21) were produced by T2 (Leaf mold) and T7 (soil + Leaf mold + Coconut Husk), respectively (Fig. 3). Statistically similar results were observed for T3 (Coconut Husk), T1 (soil) and T4 (Soil + Leaf mold) producing 7.29, 7.18 and 7.11 flowers per cluster, respectively. The least response for flowers per cluster (5.00) was recorded in T5 (Soil + Coconut Husk). The availability of organic matter in Leaf mold might be the reason for good flower production in stock plants. Our results are in agreement with previous findings of Younas *et al.* (2008) who also obtained maximum Dahlia flowers on leaf manure. Similarly, Ali *et al.* (2011) also found maximum number of florets in mushroom compost and leaf mold may also be attributed to the maximum number of leaves in these media, which promote the photosynthesis and hence increased the number of florets.

Maximum number of flowers per plant (34.66) were recorded in T2 (Leaf mold) followed by T7 (Soil + Leaf mold + Coconut Husk) with 25.31 flowers per plant, as shown in Fig.3. Statistically similar results were recorded in T6 (Leaf mold + Coconut Husk), T4 (Soil + Leaf mold) and T1 (soil) with 24.33, 21.44 and 21.33 flowers per plant, respectively. The least number of flowers per plant was recorded in T3 (Coconut Husk) and T5 (Soil + Coconut Husk) producing 19.55 and 19.88 flowers per plant, respectively. It was observed that leaf mold has the potential to induce more number of flowers per plant. Similar results were quoted by Qadir and Ishtiaq (1998) who also stated that different media had highly significant affected number of flowers per plant, in Balsam.

Maximum days to flower persistence life (6.33) were recorded in T7 (Soil + Leaf mold + Coconut Husk). All the other treatments showed non-significant behavior against each other. The statistically similar results were observed for T6 (Leaf mold + Coconut Husk), T4 (Soil + Leaf mold), T2 (Leaf mold) and T3 (Coconut Husk) which took 6.00, 5.66, 5.50, 5.50 days to flower persistence life, respectively. The minimum days of flower persistence life (5.16) were recorded in T1 (Soil).

***Conclusion*:** Based upon this particular study, it can be concluded that leaf mold (100%) encouraged the growth and flowering of Stock (*Matthiola incana)* plant in pots, as compared to all the other growing media used, as it produced maximum plant height, flowering cluster, flowers per cluster and flowers per plant.

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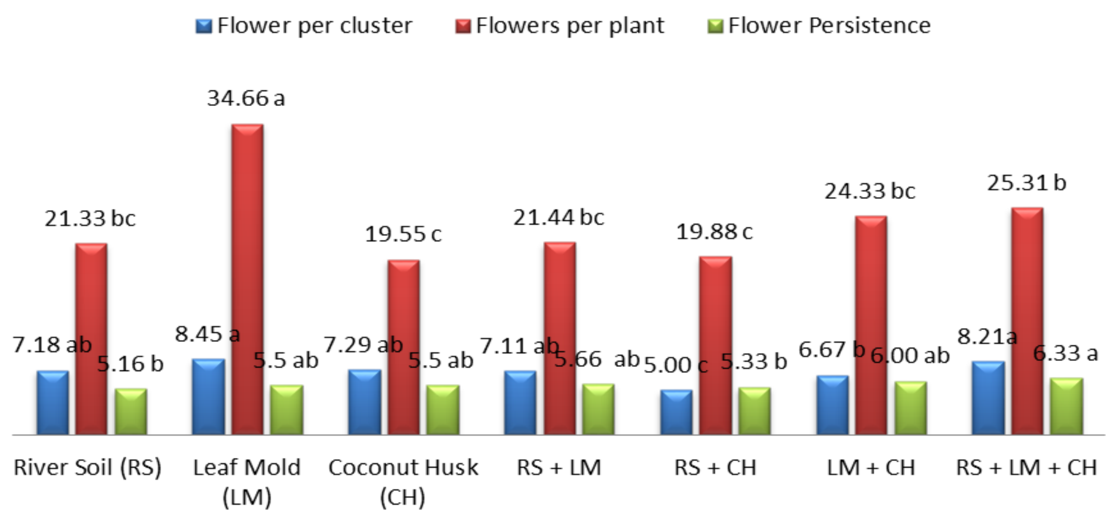

Figure 3. Flower per cluster, flower per plant and flower persostance of stock as affected by different growing media

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