

*Full Length Research Paper*

# Evaluation of the effects of various media on growth and physical characteristics of *Calendula*

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In this study, effects of various media on growth and physical characteristics of *Calendula* were evaluated. 20 days old seedlings were transplanted on different crop residues as media, including, Siltas control FYM+Silt (1:3), FYM+Silt (1:3) Maize crop residues and FYM+Silt (1:3) cockscomb as treatment, Completely Randomized Designs (RCBD) was applied to test the significance of treatments and means were compared. Highly significant results were found in all the parameters studied. Result showed that using maize residues significantly affected plant height (31cm) with maximum number of leaves (32) and more number of branches (15.33). The greatest numbers of flowers (15) were found in maize residues as compared to cockscombs residues. Cockscomb residues remain second in growth parameters while control has little effect on growth performance of *calendula*. These results lead toward better growth of production with maximum number of flowers.

**Key words:** *Calendula officinalis* L. residues, maize residues, cockscomb residues, vegetative growth.

## INTRODUCTION

*Calendula* is an herbaceous annual or short-lived perennial native to Egypt (Mohammad and Kashani, 2012), but widely naturalized throughout temperate climate zones. *Calendula* has been cultivated since Roman times for its purported medicinal properties (Macht, 1955). Today *calendula* is grown for medicinal/herbal (Mohammad and Kashani, 2012), and ornamental uses (Clark et al., 2010). *Calendulas* produced for ornamental use include both cut flowers and potted flowering plants. While cut flowers and herbs may be grown either in the field and pots (Clark et al., 2010; Mohammad and Kashani, 2012) or in the greenhouse (Hamrick, 2003).

Growth medium and crop residues are known to have great effect on value of potted floriculture plants (Vendrame et al., 2005) and plays an significant role in

germination rate, and many other physical parameters such as plant height, number of leaves, number of flowers and yield etc. Different kinds of manures provide good nutrition when applied to plants alone, in combination with other soil less substrates (Khobragade et al., 1997). Different morphological produced best results favored by different media are observed in tuberose (Mahrose, 1999).

Suitable growing medium or crop residues are important for quality of foliar and flower production as these maintenance plant rooting system (Awang et al., 2009). Moreover, these are essential for sufficient absorption of water, provision of nutrients as well as gaseous exchange between roots and outside the atmosphere in growing medium (Abad et al., 2002). Garden topsoil has been commonly used by the growers for raising most floricultural crops, though, it is a non-renewable resource, so sustainable flower production cannot rely on non-renewable natural resources (Marianthi, 2006). Materials such as peat and natural

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**Table 1.** Mean effect of different crop residues on growth parameters of Calendula.

Media (1:3)	Plant height (cm)	Total leaf	Total branches	Total flower	Fresh weight (g)	Dry weight (g)
Control						
Silt	21.00d	30.67c	8.00 c	5.67c	34.50c	6.53d
<b>Crop residues</b>						
FYM+Silt	25.33c	29.00d	3.67d	4.00d	16.47d	7.60c
Maize (FYM+Silt)	31.00a	35.00a	15.33a	15.67a	80.17a	9.30a
Cockscomb (FYM+Silt)	28.67b	33.00b	10.33b	8.33b	63.73b	8.23b

soils are commonly are common for the production of substrates for floricultural crops (Guerrero and Polo, 1990).

Though the Calendulas is one of the important flower crops of Pakistan, its yield potential are low and hence, there is a need to optimize the growing media for its growth and performance. Again due to an increasing demand and quality of cut flowers availability, keeping in view these problems, present study was designed with the specific objective of measuring the potential of calendula on crop residues as potting media.

## MATERIALS AND METHODS

The experiment was carried out in substrates, to evaluate the effects of different media on calendula growth and physical characteristics in college of agriculture Bahadur sub-campus BZU Multan during winter 2013. Calendula seeds were purchased from a well reputed seed agency and nursery was raised in the pots containing silt. 20 days old seedlings were planted in pots. The experiment was performed in the pots. A Completely Randomized Designs (RCBD) was established, including Silt as control, Farm Yard Manure (FYM+Silt) (1:3), FYM+Silt (1:3) Maize crop residues and FYM+Silt (1:3) cockscomb, effects on Calendula flowers physical characteristics. The residues were obtained from freshly harvested crops of maize and cockscomb in the pots for determination of plant growth indices, each treatment unit comprised of five pots in each replicate and repeated thrice with 3 plants each pot. Observations on each plant were made and their averages were taken for plant height (cm), total number of leaves, total number of branches, total number of flower, fresh weight (g), and dry weight (g). All the parameter was recorded at blooming stage.

The data were statistically evaluated by analysis of variance according to a Completely Randomized Designs (RCBD) design and means were calculated using the program Statistix. Differences between the treatments were determined using LSD test.

## RESULTS AND DISCUSSION

In this study, a significant attention was given on the

effect of crop residues on growth and performance of calendula. All the parameters are discussed here:

### Plant height (cm)

The significant differences was recorded among the treatments for Plant height, that the Maize residue had the highest plant height (31 cm) (Table 1). Plant height (31 cm) in maize media and the minimum height (21 cm) were silt (control). The residues of maize give better results than cockscomb, farm yard manure and control. With respect to the results, using Maize residue treatment increased significantly the plant height Calendula, as compared to other treatment during experiment. The possible reason may be the fertilizer and other factors added during crop rising. The results are in conformity with those reported by Sigedar et al. (1991) in calendula, who obtained highest plant spread by the application of different growing media. The results are in conformity with those reported by Mokashi (1988) and Kareem (2013).

### Total number of leaves

Plants raised on different crop residues produced maximum number of leaves on maize crop residue (35 leaves) and 33 in cockscomb residue, 30 in silt and 29 leaves in Farm Yard Manure respectively. More number of leaves may be high nutritional status of maize and cockscomb residues as compared to control. (Bi et al. 2010) observed variation in the number of leaves plants. It has been hypothesized that using organic substrates may increase aeration, which influences N mineralization (Succop and Newman, 2004). The poor performance of silt could also be a result of a micronutrient deficiency, but this was not measured.

### Total number of branches

Crop residues have significant effects on number of branches per plant as in Table 1. Heist 15.33 numbers of branches was found in maize crop residues and lowest

numbers of branches (3.67) were calculated Farm yard and silt. A total number of leaves (10.33) were also found in cocks comb witch are less than maize residues and greater than control. This may also be due the fertilizer and other factors added during crop rising in residues. The other possible may be the organic matter and aeration of media that facilitated the root growth that lead more uptake of water and nutrients.

### Total number of flowers

Significant positive results were found for the results of total number of flowers in calendula crop greater number of flowers (15.67) were found in maize residues lowest numbers (4) were found in Farm yard manure than control (5) and cockscomb residues (8.33). Crop residues contain additional organic and mineral nutrition, which was found to increase both the number of flowers and essential oil concentration (Berimavandi et al., 2011).

### Fresh weight (g)

A variation in fresh weight of plants was observed among the residues and the differences were statistically significant as shown in Table 1, fresh weight was increased significantly in maize crop (80.17 g) residues while lowest fresh weight was recorded in (16.47 g). There is a significant positive relation between the lag total inorganic nitrogen of the residues and the final biomass of plants; this might be attributed to the organic matter and the nitrogen becoming available to the crop (Fornes et al., 2007; Warner and Erwin, 2005).

### Dry weight (g)

According to results shown in Table 1, dry weight decreased significantly in silt (6.5 g), the highest root dry weight was found in maize residues (9.30 g).

### Conclusion

Different crop residues have significantly affected morphological characters in Calendula. The using of different crop residues recommended to improving biomass and flowers. In this study, influences of different crop residuetreatments improving quality of calendula during vegetative and flowering period investigated. This research showed different behavior in all measured parametersfor growth and performance for all treatments. Using maize residues significantly affected plant height, total number of leaves, total number of branches, and total number of flower, fresh weight and dry weight. In addition, statistical significant variation was observed

between control and crop residues in all measured parameters.

Thus, the results suggest that different crop residues treatments have the potential to be used for commercial to improvement of quality of calendula flowers.

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