1. INTRODUCTION

Marigold (*Tagetes erecta* L.) belongs to family Asteraceae and is native of Central and South America specially Mexico. From Mexico, it spread to different parts of the world. It is an annual, herbaceous plant with upright growth habit and produces profuse branching when apical dominance is broken. The plant height varies from 15-150cm depending upon the genotypes, growing conditions and landscape value. The flower called head/capitulum consists of numerous ray florets with small to big size disc florets. Usually the flowers are of bright attractive colours comprising orange, yellow, golden yellow, red, white and stripped ray florets. The pollination largely takes place through the insects especially by the honeybees (*Apis dorsata* and *Apis florea*). The mature seed is of bright jet black colour and is called achene. The seed is dicotyledonous with moderate storage life.

Marigold is one of the most commonly grown cut flowers in India and is extensively used in religious and social occasions in one form or the other. Main uses are to decorate the walls, gates and other important places like marriage homes, restaurants, temples, receptions, farewells, birthday occasions and various public and social events, apart from its use as loose-flower for garland making and offering to god and goddess. Marigold is widely grown in fields, gardens and pots. It is highly suitable as a bedding plant, in a herbaceous border and is also ideal for newly planted shrubberies to provide colour for aesthetic value and to fill the space.

Various parts of the plant have medicinal and nematicidal properties for
keeping the nematodes population in soil under control. Marigold is also recommended for growing as a trap crop with the tomato and onion to control/reduce the menace of fruit borer and thrips in IPM system. The marigold species *T. minuta* is grown for oil extraction in Kullu valley of Himachal Pradesh. The flowers (petals) are good source of natural colours and have immense potential value for food and feed industry particularly for poultry feed for increasing the yolk contents in eggs. Besides, both leaves and flowers are quite important from medicinal point of view, because leaf paste is used externally against boils and carbuncles. Marigold leaf extract is a good remedy for earache. Further, flower extract is considered as blood purifier, a cure for bleeding piles and is also a good remedy for eye diseases and ulcers. The oil content of marigold can find a use in the perfume industry.

African marigold or big marigold (*Tagetes erecta* L.) is a quite popular and homely flower in India. It is also grown in other countries viz. Mexico, Brazil, W. Europe, Pakistan, Cambodia, Georgia and Iran. It has gained popularity due to its easy culture, wide adaptability of free flowering habit and short duration to produce marketable flowers. The wide range of attractive colours, shape, size and good keeping quality of this variety had attracted the attention of growers. Three species, *Tagetes erecta* (African marigold), *T. patula* (French marigold) and *T. tenuifolia* (Striped marigold) are the most common in cultivation.

Marigolds occupy prominent position among the traditional loose flowers grown in India and ranks next only to Jasmine in terms of production. It is estimated that marigolds are being grown in 15000 hectare area (Gupta et al., 2002). Its cultivation is spread over Karnataka, Tamil Nadu, Uttar Pradesh, Bihar, West Bengal, Andhra Pradesh, Kerala, Haryana, Punjab, Delhi and
Himachal Pradesh. In recent years large scale cultivation of marigold has been practiced in Kota and Ratlam regions of Rajasthan and Madhya Pradesh respectively for loose flower and farmers are fetching attractive prices for their produce. Marigold is being grown as an industrial crop in Salem, Erode and Coimbatore districts of Tamil Nadu under contract farming by private sector companies for extraction of xanthophylls and carotene.

The area under flower crops in India is about 1.61 million hectares which account for the production of 870.37 thousand tonnes of loose flower and 43417.46 lakh nos. of cut flower with the average productivity of 5.4 t/hectare. (NHB; 2008). The average productivity of loose flower is low in our country than in the developed countries viz. USA, Germany, England and Isreal etc. The lower productivity of flower particularly of loose flower could be attributed due to the limited availability of high quality seed and planting materials and lack of development of the F-1 hybrids. The area occupied by loose flower is planted by the traditional varieties that are not genetically pure or is a mixture with other loose flower crops. In the case of marigold the major area is covered with the old and traditional varieties (African Giant, African Tall, African Yellow, Calcattia and Laddo Gainda etc.) which are low yielders. Some high yielding cultivars of marigold like Pusa Narangi Gainda and Pusa Basanti Gainda have been developed at Indian Agriculture Research Institute (Raghava, 1998). In order to improve the productivity of marigold, it is imperative to increase the area under improved and high yielding varieties like Pusa Narangi Gainda and Pusa Basanti Gainda. Accordingly, to cover more area with high yielding varieties, there is a need to improve the seed supply as the quality seed of marigold cv. Pusa Narangi Gainda is in short supply due to the fact that seed production practices have not been standardized so far. Although, seed produc-
tion of marigold is highly profitable and net return of Rs.20, 687/- per acre could easily be obtained (Tomar, 1999). Thus, there is possibility to adopt the seed production programme as an alternative by the farmers. The demand of quality seed of marigold cv. Pusa Narangi Gainta is also growing within the country and for export to foreign countries. It has been observed that 10 quintal seed of marigold was exported during 1993-94 (Sikhamani, 2003).

It is well established fact that quality seed is a basic input for the successful crop production (Dahiya 1993). Therefore, the production of quality seed is very crucial. Thus, the present investigation will focus on the standardization of seed production practices of marigold to improve the availability of quality seed for commercial cultivation of crop so that the farmers could harness good return from its cultivation. Since, the information on seed production practices, planting time, spacing, pinching and its interaction effect on seed yield and quality in African Marigold is very scanty, therefore, it is planned to undertake the investigation on "Effect of planting time, spacing and pinching on seed yield and quality in African Marigold (Tagetes erecta L.)" and the present study was carried out at Chaudhary Chhotu Ram (P.G.) College, Muzaffar Nagar, UP with the following objective:

- To standardize the optimum time of planting for higher seed yield and quality attributes
- To standardize the suitable spacing for higher seed yield and quality attributes
- To study the effect of pinching on seed yield and its quality
- To study the interaction between the planting time, spacing and pinching on seed yield and its quality.