AGROTECHNOLOGY AND PRIMARY SEED PRODUCTION OF CALENDULA OFFICINALIS L. (MARIGOLD)

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Abstract*. This study investigates the agrotechnology and seed production system of Calendula officinalis (marigold) based on scientific analysis. The impact of cultivation practices on yield, methods to improve seed quality, and the influence of ecological conditions on growth processes were evaluated. The findings provide recommendations for optimizing production capacity and resource utilization in marigold cultivation.*
Keywords: *Calendula officinalis, agrotechnology, yield, seed quality, crop productivity.*

Introduction

Calendula officinalis L. (marigold) is widely used in the pharmaceutical, cosmetic, and food industries due to its bioactive compounds, including flavonoids, carotenoids, and essential oils with antiseptic properties (Bown, 1995, p. 112; Duke, 2002, p. 78). The cultivation of high-quality seed material is of significant scientific and practical importance (Anderson, 2018, p. 54). This study aims to determine the optimal agrotechnology for marigold cultivation, analyze primary seed production, and evaluate yield and productivity based on scientific principles.

Materials and Methods

The research was conducted in the Tashkent region of Uzbekistan during 2023–2024. Experiments were organized in a randomized block design with three replications (Zeven & de Wet, 1988, p. 34).

2.1. Research Conditions

Climate: Average temperature ranged from +16°C to +28°C, with annual precipitation of 250–350 mm (Smith & Jones, 2017, p. 92).

 Soil Type: Medium loamy, fertile soil with a pH of 6.5–7.2 (FAO, 2006, p. 143).

 Fertilization: Before planting, 40 kg/ha of P_2O_5 and 60 kg/ha of K_2O were applied, followed by 30 kg/ha of N during the vegetation period (Marschner, 2012, p. 89).

2.2. Planting practices

Table 1.

Variant

Planting Scheme (cm)

Plant Density (plants/m²)

V1

30 × 70

5.7

V2

30 × 60

5.5

V3

20 × 70

5.0

Three planting schemes were tested

2.3. Evaluation Methods

Germination Rate (%): Assessed at 7–10 day intervals (ISTA, 2011, p. 55).

Growth Rate (cm/day): Monitored during the vegetation period.

Yield (g/m²): Dry biomass weight of flowers was measured (Kays, 2011, p. 212).

Seed Quality: Evaluated based on the weight of 1000 seeds and germination rate (Ellis et al., 1985, p. 67).

Results

3.1. Impact of Planting Scheme on Yield

The influence of different planting schemes on yield is presented in Table 2.

Table 2.

Variant

Germination Rate (%)

Average Height (cm)

Biomass (g/m²)

Seed Germination Rate (%)

V1

87.3

42.5

610

91.2

V2

84.5

40.2

580

89.8

V3

81.2

38.8

550

88.5

Impact of Planting Scheme on Yield

Analysis: The highest yield (610 g/m²) was observed in V1 (30×70 cm). Plant height and seed quality were also highest in this variant.

Discussion

The results align with previous studies. Duke (2002, p. 78) emphasizes the importance of optimal cultivation practices for maximizing yield. Smith & Jones (2017, p. 93) note that increased plant density can reduce yield, which is consistent with our findings. The selection of high-quality seed material and optimization of agrotechnical practices are critical for improving productivity (ISTA, 2011, p. 55).

Conclusion

The 30 × 70 cm planting scheme proved to be the most effective for Calendula officinalis cultivation, yielding the highest biomass and seed quality. Soil fertility and moisture

significantly influence productivity. The selection of quality seed material and optimization of agrotechnical methods are essential for enhancing yield.

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