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# Introduction of Ajwain (*Trachyspermum ammi* L.) Varieties in Northern Dry zone of Karnataka

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**ABSTRACT: A technology demonstration of ajwain (*Trachyspermum ammi* L.) was aimed to improve the production after bringing new variety into cultivation in Vijayapur district of northern Karnataka. Studies were carried out to assess yield and economics of a new variety, AA-1 and AA-93 at the farmer's field under on farm testing trial (OFT) for two years (2019-20 to 2020-21). Among different ajwain varieties AA-1 recorded significantly higher yield (1170 and 1192 kg ha$^{-1}$) as compared to local variety Kadapa (772 and 812 kg ha$^{-1}$). Similar trend was observed for growth and yield parameters. The highest gross returns (Rs. 179088 and Rs. 178111 ha$^{-1}$) and BC ratio (4.32 and 4.44) for 2019-20 and 2020-21 respectively were realized with AA-1 variety as compared with farmer's variety Kadapa.**

**Keywords:** Ajwain, AA-1, AA-93, Kadapa, Northern Karnataka, Yield and economics.

## INTRODUCTION

Ajwain, a member of the Apiaceae family, is an Egyptian native and a major seed spice crop in India. It's a little egg-shaped grayish brown annual herbaceous plant with small egg-shaped grayish brown fruits. India, Persia, Iran, Egypt, Afghanistan, Pakistan, and North Africa are the biggest Ajwain producers in the world. Rajasthan, Gujarat, Andhra Pradesh, Madhya Pradesh, Bihar, Uttar Pradesh, Tamil Nadu, and West Bengal are the largest producers in India. Ajwain is a herbaceous annual plant. The crop is densely branching, with a height of 69-90 cm and silky fine hair. It has feathery leaves with 2-3 pinnately split and linear segments. Flowers in a complex umbel at the end of the flowering stem. The ovoid form of the little grayish, white fruits. Cross-pollination occurs through insects, and the blooms are foreboding. Ajwain seed nutritional composition varies depending on cultivar, area, and harvest stage. Moisture (8.9%), protein (15.4%), fat (ether extract) (18.1%), crude fibre (11.9%), carbs (38.6%), mineral matter (7.1%), calcium (1.42%), phosphorus (0.30%), iron (14.6 mg/100 f), and a calorific value of 379.4 per 100 g are all present in the seed (Pruthi, 2001). The adaptation of a variety to the soil and climatic conditions, as well as its resistance to pests and diseases, are the most important factors in its selection. In various places, multiple kinds have been released for cultivation.

Ajwain is a cold-loving crop that is primarily grown in India during the *rabi* season. It is also grown as a late *kharif* crop in various parts of the country. Plant development and flowering are aided by a moderately chilly and dry atmosphere. High humidity should be avoided, especially after flowering. Insect pests and a variety of diseases thrive in humid, overcast conditions. During its growth period, it requires a temperature of 15-27°C and a relative humidity of 60-70%, as well as relatively warm weather for seed development. The crop, on the other hand, has a moderate level of drought resistance and a wide range of environmental adaptation, as it can also be cultivated in the *kharif* season. Ajwain can grow in a variety of soils, but it prefers well-drained loamy soils. If suitable drainage facilities are available, organic matter-rich clay-loam soil can also be employed.

The crop, on the other hand, does not fare well in sandy or gravely soils. The thick soils are good for rainfed ajwain cultivation due to their great moisture retention. Although the crop is salinity tolerant, it produces larger yields and better leaf quality on neutral soils with a pH range of 6.5 to 7.5. As a result, it should generally be avoided in soils that are saline, alkaline, or acidic.

The Ajmer ajwain-1 (AA-1) variety was developed at NRCSS, Ajmer, as a consequence of recurrent selection

from the Pratapgarh local. It may be grown in both irrigated and rainfed environments. Plants average 112 cm in height and 219 umbels per plant. It is a long-season cultivar that matures in about 165 days. The variety has a high yield potential, with an average yield of 14.26 q/ha when irrigated and 8.8 q/ha when rainfed. This variety's seeds have a 3.5 percent essential oil content. In this context, the current study aims to provide a snapshot of the state of ajwain production in northern Karnataka so that relevant policies can be implemented to increase output.

## MATERIALS AND METHOD

On farm testing trial was carried out during the late *kharif* season of 2019-20 and 2020-21 under semi-arid conditions of Karnataka at Tajpur village of Vijayapur district (situated at 16° 46′N latitude, 75° 32′E longitude and at an altitude of about 629 m above mean sea level). With the improved package of practice, assessment was carried out by taking 0.4 ha as a unit and covered a total area of 4.0 ha. The trial was carried out with 3 treatments ($T_1$=Farmers variety, $T_2$= AA 1 and $T_3$= AA 93 varieties) and 10 replications under randomized complete block design in the farmer's field. The soil should be brought to fine tilth for good germination and plant growth. The first ploughing should be done by soil turning plough followed by 2-3 light ploughing by harrow or cultivator. Each ploughing should be followed by planking to conserve the moisture. The soils of demonstration field for evaluating ajwain crop was deep clay soil with pH 8.0, available organic carbon 0.43 per cent, available N, P and K were 246.1, 39.7 and 472.9 kg $ha^{-1}$, respectively. Sowing of ajwain was taken up in two consecutive years on 28$^{th}$ August 2019 and 27$^{th}$ August 2020 at farmer's field. Seeds of ajwain varieties (AA-1 and AA-93) procured from NRCSS, Ajmer and were sown in line using drill sowing and seed rate of ajwain was 5.0 kg $ha^{-1}$ in both the year. Weeds were controlled through one hoeing at 30 days after sowing and one manual weeding. The recommended rate of N (100 kg $ha^{-1}$) and $P_2O_5$ (50 kg $ha^{-1}$) was applied for ajwain at the time of sowing. The remaining cultivation practices were carried out according to the UAS, Dharwad package of practice. Each year, farmers were given a pre-seasonal training and two trainings throughout the crop time to prepare them for the application of a certain package of activities. Ajwain was harvested on 15$^{th}$ and 13$^{th}$ February 2019 and 2020, respectively. The crop was harvested with sickles or manually and stacked for drying, kept the bundles upside down and then threshed to separate the fruits by beating with sticks. In each treatment, five plants were chosen at random from a total of ten sites. The yield features and yield parameters of ajwain were measured using standard procedures. Using the Web Based Agricultural Statistics software Package, variables were analyzed and the least significant difference (LSD) test was performed on the studied mean square errors (WASP 2.0). The difference in significance and non-significance between treatments was calculated using a technique that yields a single LSD result (Gomez and Gomez, 1984). Correlation studies among the yield components of ajwain were conducted using the XLSTAT tool.

## RESULT AND DISCUSSION

*A. Effect on plant height*

The data on the influence of different ajwain varieties on plant height at 45, 90, 135 DAS and at harvest are presented in Table 1. It concluded that the plant height of ajwain increased with the advancement of crop age. AA-1 variety significantly increased the plant height by 9.46 and 12.48 per cent over the farmer's variety (Kadapa) for 2019 and 2020 respectively. The maximum plant height at harvest was recorded in AA-1 variety (77.50 and 79.30 cm) which is on-par with AA-93 variety (74.60 and 73.50 cm) for 2019 and 2020 respectively. Whereas, the least plant height was found in farmer's variety (Kadapa). The variation in plant height as a result of genetic makeup of genotype and its interactivity with the favorable agro climatic and soil condition. Parsoya *et al.*, (2018) concluded that sole ajwain cultivation resulted in higher plant height and number of branches per plant at 60 DAS, 90 DAS and at harvest as compared to different intercropping system.

**Table 1: Plant height (cm) of ajwain as influenced periodically by different treatments.**

| Treatments | Days after sowing | | | | | | At harvest | |
|---|---|---|---|---|---|---|---|---|
| | 45 DAS | | 90 DAS | | 135 DAS | | | |
| | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 |
| Farmers practice, Kadapa ($T_1$) | 15.60 | 16.00 | 50.55 | 51.30 | 68.40 | 69.25 | 70.80 | 70.50 |
| Ajmer ajwain, AA 1 ($T_2$) | 20.15 | 21.30 | 60.35 | 59.15 | 74.60 | 76.35 | 77.50 | 79.30 |
| Ajmer ajwain, AA 93 ($T_3$) | 17.60 | 18.55 | 54.55 | 56.20 | 72.00 | 72.50 | 74.60 | 73.50 |
| SEm ± | 0.842 | 0.935 | 1.976 | 0.988 | 0.881 | 1.280 | 0.968 | 1.943 |
| CD (0.05) | 2.531 | 2.810 | 5.951 | 2.980 | 2.651 | 3.881 | 2.925 | 5.851 |

*B. Effect on number of branches*

The terminal outcome of growth was the vegetative and reproductive development of the crop, culminating in economic yield, which was influenced by the constant interplay between the environment and plant physiological processes. The maximum number of branches per plant was observed in AA-1 variety which is on-par with AA-93 variety (Table 2). AA-1 variety significantly increased the number of branches per plant by 26.15 and 13.07 per cent over the farmer's variety (Kadapa) for 2019 and 2020 respectively.

**Table 2: Number of branches plant$^{-1}$ of ajwain as influenced periodically by different treatments.**

| Treatments | Days after sowing | | | | | | At harvest | |
|---|---|---|---|---|---|---|---|---|
| | 45 DAS | | 90 DAS | | 135 DAS | | | |
| | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 |
| Farmers practice, Kadapa ($T_1$) | 5.50 | 5.80 | 11.40 | 11.15 | 13.00 | 14.15 | 13.00 | 14.15 |
| Ajmer ajwain, AA 1 ($T_2$) | 6.45 | 6.80 | 12.90 | 13.50 | 16.40 | 16.00 | 16.40 | 16.00 |
| Ajmer ajwain, AA 93 ($T_3$) | 6.10 | 6.00 | 12.00 | 12.60 | 15.55 | 14.75 | 15.55 | 14.75 |
| SEm ± | 0.116 | 0.276 | 0.306 | 0.302 | 0.286 | 0.421 | 0.273 | 0.412 |
| CD (0.05) | 0.376 | 0.854 | 0.945 | 0.935 | 0.887 | 1.275 | 0.853 | 1.249 |

*C. Effect on yield and economics*

It is evident from the data presented (Table 3) that among the different ajwain varieties highest yield was registered in AA-1, 1170 kg ha$^{-1}$ (2019) and 1192 kg ha$^{-1}$ (2020) which is on-par with AA-93, 1055 kg ha$^{-1}$ (2019) and 1028 kg ha$^{-1}$ (2020) respectively (Table.3). AA-1 variety increased the yield by 51.55 per cent (2019) and 46.78 per cent (2020) over the farmer's variety (Kadapa). These results are in good agreement with Hasan *et al.*, (2017) who concluded that intercropping patterns significantly decreased the yield and yield components of ajwain and isabgol. The maximum seed yield of ajwain (2309 kg ha$^{-1}$) and isabgol (539 kg ha$^{-1}$) were obtained in sole cropping.

**Table 3: Yield and economics of ajwain as influenced periodically by different treatments.**

| Treatments | Yield (Kg ha$^{-1}$) | | Gross return (Rs ha$^{-1}$) | | Net return (Rs ha$^{-1}$) | | B:C ratio | |
|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 |
| Farmers practice, Kadapa ($T_1$) | 772 | 812 | 143336 | 138562 | 101120 | 99340 | 3.40 | 3.31 |
| Ajmer ajwain, AA 1 ($T_2$) | 1170 | 1192 | 179088 | 178111 | 137598 | 136480 | 4.32 | 4.44 |
| Ajmer ajwain, AA 93 ($T_3$) | 1055 | 1028 | 159408 | 156380 | 117456 | 115683 | 3.81 | 3.70 |
| SEm ± | 38.46 | 54.12 | 6559.2 | 7243.3 | 6711.3 | 6930.7 | 0.161 | 0.241 |
| CD (0.05) | 115.6 | 164.8 | 19683 | 21733 | 20140 | 20796 | 0.503 | 0.735 |

## CONCLUSION

Farmers were effectively influenced by frontline demonstrations to embrace new varieties in ajwain farming. After conducting the frontline demonstration in the farmers' field, the majority of the farmers were aware of the recommended ajwain production procedures. The demonstrations economic specifics give us the green light to further publicize them among farmers for large-scale adoption. It can be concluded from the study that increased ajwain yield was due to the adoption of improved varieties. On the basis of results obtained during the course of present field demonstration it is concluded that, under rainfed conditions of northern Karnataka AA-1 ajwain variety is found significant in enhancing the productivity of farmers.

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**Conflict of Interest.** None.

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