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# Growthand Yield and Economics of Ridge Gourd (*Luffa acutangula* L.) under Drip Fertigation in Summer Season

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## Abstract

A field experiment entitled, "Response of Ridge Gourd to fertigation in Summer Season" was conducted during the year 2022-23. The experiment was carried out in Randomized Block Design with nine treatments replicated three times.Ridge gourd crop was planted by hand dibbling on 23rd Feb, 2023 at 1.5 x 1 m spacing.The results indicated that, the treatment of DIwith application of nutrientsas persoil test valuesthrough ferigation ($T_7$) significantly enhanced the yield and yield contributing characters. The results indicated that, the treatment of DIwith application of nutrientsas persoil test valuesthrough ferigation ($T_7$) significantly enhanced the yield and yield contributing characters *viz*., vine length, number of primary branches per plant, number of leaves per vine and days to 50 per cent flowering.Fertigation was found to be more beneficial than application of fertilizer through conventional method in respect of increasing yield and water saving. The treatment $T_7$ produced significantly higher yield (27.55t $ha^{-1}$) than all other treatments. The treatment $T_7$ recorded significantlyhigher yield by 31.82 per cent over $T_5$. On the basis of the results obtained, it can be concluded that drip irrigation with 80 per cent RDF through fertigation as per growth stages is the best treatment for higher yield, nutrient availability and uptake, and monetary returns from ridge gourd crop (var. Aarti) cultivated in medium deep soil of Maharashtra with 20 per cent fertilizers saving.

**Key words : Drip fertigation, yield contributing characters, economics.**

Ridge gourd [*Luffa acutangula* (L.) Roxb.], popularly known as Angled gourd, Chinese okra, Ribbed gourd, Turai, Dodkaand Kalitori. This crop belongs to genus *Luffa* of "*Cucurbitaceae*" family. Ridge gourd is known to have originated in India and is cultivated in the tropics and sub-tropics for its tender edible fruits both on commercial scale and in kitchen gardens throughout the country and in some other parts of the world. Ridge gourd is cultivated in Bangladesh, China, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka and Taiwan and different region of India such as Maharashtra, Assam, West Bengal, Uttar Pradesh, Karnataka, Andhra Pradesh, Kerala, Tamil Nadu and Maharashtra (Bose and Some, 1986).

Fertigation with drip irrigation practices is gaining higher momentum in present day crop production. The water and nutrient are the vital source of crop production and is the most limiting factor in Indian agricultural scenario. Hence the present study was laid out to study the response of ridge gourd under fertigation in summer season.

## Material and Methods

A field experiment conducted at the Research Farm of Interfaculty Department of Irrigation water Management, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar, Maharashtra, India, during summer season of 2022-2023 with objectives,to study the effect of fertigation on growth and yield of ridge gourd, to study the nutrient availability and uptake by ridge gourd under fertigation, to study the economics of ridge gourd under fertigation. The experiment

comprised of nine treatments, $T_1$ -Drip with 100% recommended dose of fertilizer through fertigation as per schedule, $T_2$ - Drip with 80% recommended dose of fertilizer through fertigation as per schedule, $T_3$ - Dripwith 60% recommended dose of fertilizer through fertigation as per schedule, $T_4$ - Drip with 100% recommended dose of fertilizer through conventional fertilizer as per schedule (N&K-drip and P- soil), $T_5$ - Dripwith 100% recommended dose of fertilizerthrough conventional fertilizeras perschedule (Soil), $T_6$ - Dripwith 100% recommended dose of fertilizer ofwater soluble fertilizer through fertigation in 15 equal weekly splits, $T_7$ - Drip with application of nutrients as per soil test values through ferigation, $T_8$ -Drip with no fertigation, $T_9$ -Surface irrigation with 100% recommended dose of fertilizer through conventional fertilizer.

The planting of the crop was done on 23rd February 2023 with a plant to plant spacing was 1 m and row to row distance was 1.5 m. The plant protection measures were adopted as per recommended package of practices. For recording various growth observations, three plants were selected with random sampling technique from each net plot. The plastic-coated labels were tied to each observational plant for easy identification. All the observations *viz*., vine length, number of primary branches vine$^{-1}$, number of leaves vine$^{-1}$ and days required to 50 per cent flowering were recorded on these observational plants.

## Results and Discussion

**Yield and yield contributing characters:** The data regarding yield of ridge gourd in tonnes per hectare was found maximum in treatment of DIwith application of nutrientsas persoil test values through fertigation ($T_7$) (27.55 t ha$^{-1}$). However, it was at par with treatment of Drip with 100% RDF through fertigation as per schedule ($T_1$), Drip with 100 RD of WSF Through fertigation in 15 equal weekly splits ($T_6$) and Drip with 80% RDF through fertigation as per schedule ($T_2$). The minimum fruit yield is observed in the treatment $T_8$ (14.42 t ha$^{-1}$) which is DI with no fertigation. The maximum per cent increase in yield over $T_5$ was observed in $T_7$ (31.82%) followed by $T_1$ (28.32%), $T_6$ (26.70%) and $T_2$ (21.43%). The maximum yield of ridge gourd in fertigation treatment might be due to the frequent application of fertilizer to the root zone through fertigation coupled with better

**Table 1.** Yield and yield attributing characters of ridge gourd

| Treatments | Av. wt. of fruits vine$^{-1}$ (kg) | Fruit yield (t ha$^{-1}$) | % of yield increased over $T_5$ |
|---|---|---|---|
| $T_1$ - Drip with 100%RD through fertigation as per schedule | 4.473 | 26.82 | 28.32 |
| $T_2$ - Drip with 80%RD through fertigation as per schedule | 4.310 | 25.38 | 21.43 |
| $T_3$ - Drip with 60%RD through fertigation as per schedule | 2.871 | 19.38 | - |
| $T_4$ - Drip with 100% RD through CF as per schedule (N&K- drip and P- soil) | 3.160 | 22.44 | 7.37 |
| $T_5$ - Drip with 100% RDF of CF applied through soil | 3.112 | 20.90 | 0.00 |
| $T_6$ - Drip with 100%RD of WSF through fertigation in 15 weekly splits | 4.376 | 26.48 | 26.70 |
| $T_7$ - DI with application of nutrientsas persoil test values through fertigation | 4.515 | 27.55 | 31.82 |
| $T_8$ - DI with no fertigation | 1.664 | 14.42 | - |
| $T_9$ - Surface irrigation with 100% RDF through CF | 2.652 | 19.59 | - |
| S.E m (±) | 0.07 | 0.78 | |
| CD at 5% | 0.23 | 2.29 | |
| General mean | 3.46 | 22.56 | |

root activity increases the availability of the nutrient in the soil and thus increases the uptake of nutrients to the plant. The leaching loss of nutrients under drip is lower as compare to soil application of fertilizers (Hebber *et al*., 2004).

## Growth observations

**Initial and final plant count of ridge gourd :** The mean initial and final plant count was 4374 and 4371 $ha^{-1}$ respectively.The initial and final plant population was not influenced significantly due to different fertigation schedules. The uniform plant population was observed in all the fertigation schedules.

**Vine length :** The vine length increased with the age of crop and was more vigorous during 60 and 90 days after planting. The treatment of DI with application of nutrients as per soil test values through fertigation ($T_7$) recorded significantly maximum plant height (500.27 cm) at harvest. The treatment DI with no fertigation ($T_8$) recorded minimum plant height at all stages. The highest vine length in $T_7$ is probably due to the better nutrient supply to rhizosphere and hence increases the internal metabolic activities in the plant. Similar results were reported by Shinde *et al*., (2010) in cucumber and Nayak *et al*., (2018) in pointed gourd.

**Number of primary branches $vine^{-1}$ :** The treatment of DI with application of nutrients as per soil test values through fertigation ($T_7$) recorded significantly higher number of branches (17.80) at harvest. This might be due to higher uptake of nutrients during growth period, which increases the protein and protoplasm synthesis for higher rate of mitosis and ultimately increasing growth parameters. These results are in agreement with those reported by Shukla and Prabhakar (1987) in bottle gourd. The minimum number of primary branches $plant^{-1}$ is observed in treatment of DI with no fertigation (T8).

**Number of leaves $vine^{-1}$ :** The different fertigation schedules significantly influenced the mean number of leaves $vine^{-1}$ of ridge gourd at all stages of crop growth. The DI with application of nutrientsas per soil test values through fertigation ($T_7$) exhibited significantly higher number of leaves $vine^{-1}$ of ridge gourd

**Table 2.** Growth contributing characters at harvest influenced by various treatments

| Treatments | Growth contributing characters at harvest | | |
|---|---|---|---|
| | Vine length (cm) | No. of primary branches $vine^{-1}$ | No. of leaves $vine^{-1}$ |
| $T_1$ - Drip with 100%RD through fertigation as per schedule | 498.33 | 17.47 | 187.93 |
| $T_2$ - Drip with 80%RD through fertigation as per schedule | 495.67 | 16.20 | 185.20 |
| $T_3$ - Drip with 60%RD through fertigation as per schedule | 431.47 | 12.93 | 146.40 |
| $T_4$ - Drip with 100% RD through CF as per schedule (N&K- drip and P- soil) | 480.57 | 14.40 | 171.73 |
| $T_5$ - Drip with 100% RDF of CF applied through soil | 478.27 | 13.47 | 171.53 |
| $T_6$ - Drip with 100%RD of WSF through fertigation in 15 weekly splits | 497.00 | 16.53 | 186.13 |
| $T_7$ - DI with application of nutrientsas persoil test values through fertigation | 500.27 | 17.80 | 188.47 |
| $T_8$ - DI with no fertigation | 320.33 | 11.13 | 137.67 |
| $T_9$ - Surface irrigation with 100% RDF through CF | 464.40 | 13.66 | 150.87 |
| S.E m (±) | 6.41 | 0.70 | 1.13 |
| CD at 5% | 19.24 | 2.10 | 3.37 |
| General mean | 462.92 | 14.84 | 169.55 |

(188.47) at harvest. Significantly minimum number of leaves vine$^{-1}$ was recorded in treatment of DI with no fertigation ($T_8$). These results were in agreement with those reported by Shinde *et al*., (2010) in cucumber.

**Days to 50 per cent flowering :** The number of days required to 50 per cent flowering of ridge gourd was influenced significantly due to different fertigation schedules. The treatment $T_7$ i.e. DI with application of nutrientsas persoil test values through fertigation required minimum days for 50 per cent flowering (50.07 days). However, the treatment of DI with no fertigation ($T_8$) required more number of days to 50 per cent flowering (55.67 days).

**Economics :** The study of the economics of any crop is much important, as the farmer has to choose the crop based on their economic feasibility. The cost of cultivation varies with different treatments as per fertilizer application and use of irrigation system. The maximum cost was involved in the treatment $T_1$ and $T_6$ (Rs.114226.95) followed by DI with application of nutrients as per soil test values through fertigation $T_7$ (Rs.112643.27). The lowest cost is involved in the treatment $T_9$ (Rs.81483.15).

The highest gross monetary returns is Rs.385700 ha$^{-1}$ obtained from the treatment of DIwith application of nutrientsas persoil test values through fertigation ($T_7$) followed by DI with 100% RDF through fertigation as per schedule $T_1$ (Rs.375480 ha$^{-1}$),Drip with 100% RD of WSF through fertigation in 15 equal weekly splits T6 (Rs.370720 ha$^{-1}$) and DI with 80% RDF through fertigation as per growth stages $T_2$ (Rs.355320 ha$^{-1}$).

The maximum net monetary returns is recorded in the treatment $T_7$ (Rs.273056.73 ha$^{-1}$) followed by DI with 100% RDF through fertigation as per schedule $T_1$ (Rs.261253.05 ha$^{-1}$), Drip with 100% RD of WSF through fertigation in 15 equal weekly splits $T_6$ (Rs.256493.05 ha$^{-1}$) and DI with 80% RDF through fertigation as per growth stages $T_2$ (Rs.244441.85 ha$^{-1}$).

However by the treatment of DI with application of nutrients as per soil test values through fertigation ($T_7$) recorded maximum B:C ratio (3.42) was recorded as compared to all other treatments. The B:C ratio ranged from 2.10 to 3.42. The lowest B:C ratio recorded in the treatment with no fertigation $T_8$ (2.10).

## Conclusions

All growth characters of ridge gourd like vine

**Table 3.** Cost of cultivation, gross monetary returns, net monetary returns and B:C ratio as influenced by different treatments

| Treatments | Cost of cultivation | Gross monetary return (Rs. ha$^{-1}$) | Net monetary return (Rs. ha$^{-1}$) | B:C ratio |
|---|---|---|---|---|
| $T_1$ - Drip with 100%RD through fertigation as per schedule | 114226.95 | 375480 | 261253.05 | 3.29 |
| $T_2$ - Drip with 80%RD through fertigation as per schedule | 110878.15 | 355320 | 244441.85 | 3.20 |
| $T_3$ - Drip with 60%RD through fertigation as per schedule | 107529.35 | 271230 | 163700.65 | 2.52 |
| $T_4$ - Drip with 100% RD through CF as per schedule (N&K- drip and P- soil) | 103486.15 | 314160 | 210673.85 | 3.04 |
| $T_5$ - Drip with 100% RDF of CF applied through soil | 104886.15 | 292600 | 187713.85 | 2.79 |
| $T_6$ - Drip with 100%RD of WSF through fertigation in 15 weekly splits | 114226.95 | 370720 | 256493.05 | 3.25 |
| $T_7$ - DI with application of nutrientsas persoil test values through fertigation | 112643.27 | 385700 | 273056.73 | 3.42 |
| $T_8$ - DI with no fertigation | 96150.15 | 201880 | 105729.85 | 2.10 |
| $T_9$ - Surface irrigation with 100% RDF through CF | 81483.15 | 274260 | 192776.85 | 3.37 |

length, number of primary branches vine$^{-1}$, number of leaves vine$^{-1}$ and days to 50 per cent flowering is observed significantly maximum in the treatment $T_7$. On the basis of the results obtained,it is concluded that the Drip Irrigation with 80% recommended dose (80:40:40 N:$P_2O_5$:$K_2O$ kg ha$^{-1}$) of fertigation as per growth stages is the best treatment for higher yield, nutrient use and monetary returns from ridge gourd crop cultivated in medium deep soils of Maharashtrawith 20% fertilizer saving.

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