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EFFECT OF NITROGEN APPLICATION METHODS ON THE GROWTH AND YIELD OF RIDGE GOURD (*LUFFA ACUTANGULLA)*

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ABSTRACT

Study was conducted In RCBD Design with three replicates to examine the impact of nitrogen application methods on the growth and yield of ridge gourd, evaluating 06 treatments comprising of various soil and foliar-applied N combinations. The following treatments were used: T1=Control (no N applied to the surface, no N applied to the leaves): T2=N at 75kg ha^{-1} through soil; T3=N at 75 kg ha^{-1} through soil+foliar urea at 1.5% concentration; T4=N at 75 kg ha^{-1} through soil+foliar urea at 3.0% concentration; T5=N at 100 kg ha^{-1} through soil; T6=N at100 kg ha^{-1} through soil+foliar urea at 1.5% concentration;T5=N at 100 kgha-1through soil+foliar urea at 1.5% concentration; The findings showe that various nitrogen application approaches had a major impact on all of the ridge gourd parameters calculated in this analysis (P0.05). With 258.33cm vine duration, 7.75 branches vine-1, 11.26 fruits vine-1, 281.38g average single-fruit weight, 3.25kg weight of ridge gourd fruit per vine, 36.30kg ridge gourd fruit yield plot^{-1} and 14520.55kg ridge gourd fruit yield ha^{-1}, the ridge gourd vines planted under T6 (N at 100kg ha-1 by soil+foliar application of urea at 1.5$^{\%}$ concentration) rated for both vine growth and ridge gourd yield characteristics, the ridge gourd crop fertilised with N at 100k ha^{-1} through soil ranked second, N at 75kg ha^{-1} through soil + foliar application of urea at 3.0% concentration ranked third, N at 75kg ha^{-1} through the soil+foliar application of urea at 1.5% concentration ranked fourth, and N at 75 kg ha^{-1} through soil without foliar urea ranked fifth. On all of the characteristics tested, the control plots came in last.

Key: Nitrogen, Application, Growth, Yield, Ridge Gourd.

INTRODUCTION

Ridge Gourd (Luffa Acutangulla) is a common tropical and subtropical vegetable belonging to the Luffa genus of the Cucurbitaceae family. The fruit of the ridge gourd is harvested before it ripens to be used as a crop, and it is more common in the Asian and African countries.The plant sections of the ridge gourd may be used to make sponges for the bath or bathroom and it is used as a vegetable, which is an excellent natural cure for jaundice patients. Ridge gourd is used as a vegetable in most parts of Pakistan and India more than any other summer vegetable after potato (Wikipedia, 2015).

Nitrogen is the most important factor for plant development and it occupies a special role in the soil nutrient profile, despite the importance of other components. The abundance of nitrogen in the soil is crucial for plant growth and crop production. A bumper crop production is evident when the correct amount of nitrogen is applied; nevertheless, insufficient nitrogen application may be a major cause of low crop yields. Nitrogen deficit in the soil has a negative impact on plant growth (Baloch et al., 2020). Nitrogen application at higher doses stimulates the plant's ability to transform carbohydrates into proteins, resulting in protoplasm formation (Bairwa et al., 2010). The mechanism by which nutrients are applied determines how well they are used by plants (Baloch et al., 2020). In addition to soil-applied nitrogen, foliar fertilisation (urea solution) is an effective way to meet the plant's nitrogen needs.This type of fertiliser application involves spraying fertiliser solutions/liquids directly onto plant foliage and leaves, delivering nutrients to plant tissues and other crop organs for immediate use. Deeba et al., (2010) recorded improved crop growth and yield after applying various concentrations of different organic and inorganic solutions in foliar shape. The cost of applying urea to the leaves is minimal and the plant responds quickly (Gupta et al., 2021). Due to variations in soil characteristics, foliar urea application in combination with straight soil-applied N maximum sedinet returns to growers; however, crop response to foliar nutrient application varied by place. According to Jan et al., (2000) if urea is consumed by the trees, it is transferred to ammonia. Foliar urea application has been shown to be extremely efficient, even if the majority of nutrients are picked up by the vegetation, it would not significantly lead to denitrification (Oli et al., 2020). According to the studies, nitrogen applied to the soil or to the leaves improves plant growth and yield (Vishwakarma et al., 2007), however, foliar initrogen application is more successful, particularly in water scarcity and

drought conditions (Umamaheswarappa et al., 2005). Nutrient application to the soil, on the other hand, is critical (Oli et al., 2020). The combined application of nutrients from soil and foliar methods has a greater effect on crop growth and fruitiy than any single nutrient application process (Ravikumar et al., 2001). According Suresh kumar et al., 2008, N application by soil (100kg ha^{-1}) and two sprays of urea solution 2.0% greatly and favourably affected the amount of leaves and the leaf area index as well as growth parameters such as DM yield and ridge gourd yield. According to Vishwakarma et al., (2007), N at 80 kg ha^{-1} combined with two foliar sprays of urea solution greatly increased crop growth and yield. Suresh kumar et al., (2008) found that using a variety of inorganic, organic, and bio-fertilisers suc as NPK (60: 30:20 kg ha^{-1}) panchakavya 3% N as a foliar spray and other nutrients as a soil treatment, increased ridge gourd yields. Prasad et al., (2016) used three different amounts of urea in their foliar sprays: 1%, 2% and 3%, but found that the 2.0% urea folia spray increased female flowers, fruit number per plant, fruit fresh weight and fruit yield per vine.

According to Deeba et al., (2010) crop yields in fertilised plots is more than three times higher than in unfertilized plots. According to Gupta et al., (2021), boron application at a rate of at 2.5kg ha^{-1} is necessary to produce boron adequacy in soil.

Abd El-Aal et al., (2010) and Al-Mukhtar et al., (1987) discovered that a foliage spray of urea and amino-vitiplus improved squash plant growth and fruit yield. This impact was less than that obtained when urea was applied, but it was greater than that obtained when amino-mix was applied. According to Prasad et al., (2016), ridge gourd yields were best when NPK fertilizer was applied at higher concentrations in comparison to foliar applied (2.5%). As a result, the experiment was urea carried carried out to see how nitrogen application methods affected the growth and the yield of ridge gourd.

MATERIALS AND METHODS

The research was carried out in 2015 to observe the effect of different nitrogen application on the growth and yield of ridge gourd.

The experiment was set up in a three repeated randomised full block pattern with a plot size of 5m x 5m (25m2) at the University Orchard, Department of Horticulture Sindh Agriculture University Tandojam.

To clear the rough pan, the soil was first ploughed with a disc plough and then a disc harrow was used When the field was ploughed up, the clods were ground, and the soil surface was flattened to eliminate weeds to ensure uniform irrigation water delivery. When the soil was ready after th soaking dosage, the tractor used a cultivator. After preparing a nice seed bed, ridges were prepared at 200cm intervals and seeds were sown at 100cm intervals. The experiment was started on April 16, 2015, with 3-4 seeds per point and thinning after the seedlings had established them selves.

The below are the specifics of the treatments:

Treatments = 6

T_1= Control

T2=N at 75kg ha^{-1} T2=N at 75kg ha^{-1} T2=N at 75kg soil-applied

T_3= N at 75 kg ha^{-1} through soil+foliar application of urea at 1.5% concentration

T4=N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 3.0%

T_5=N at 10 kg ha^{-1} through soil and no urea foliar application

T_6=N at 100 kg ha^{-1} through soil+foliar application of urea at 1.5% concen

The following characters had their observations recorded:

Observations to be recorded:

1. Vine length (cm)
2. Number of branches $vine^{-1}$
3. Number of fruits $vine^{-1}$
4. Single fruit weight (g)
5. Weight of fruits $vine^{-1}$ (g)
6. Fruit yield (kg $plot^{-1}$)
7. Fruit yield (kg ha^{-1})

Statistical analysis:

The results were statistically reviewed to see whether the treatment result was significant, and the L.S.D. (Least Significant Differences) test was used to compare the treatment means (Steel et al., (1997). The MSTAT-C program-ming programme would be used to run all of the statistical analyses.

RESULTS

During the year 2015 a report titled "effect of N implementation methods on the growth and yield of ridge gourd" was conducted.In an RCBD Design of three replicates, six treatments were used, each with a different combination of soil and foliar added nitrogen. The following treatments were used: T1= Control (no N applied to the surface, no N applied to the leaves): T3=N at 75 kg ha^{-1} through soil+foliar application of urea at 1.5% concentration: T4=N at 75kg ha^{-1} through soil+foliar application of urea at 3.0% concentration; T5=N at 100kg ha^{-1} through soil and no urea foliar application; T6= N at 100kg ha^{-1} through soil+foliar application of urea at 1.5% concentra-

tion. The impact of these treatments was measured against the length of the ridge gourd plant, the number of branches per plant, the amount of fruits per vine, the average weight of the fruits, the overall weight of fruits per vine, the fruit yield plot^{-1}, and the estimated fruit yield ha^{-1}.

Tables 1–7 included statistically interpreted details explaining the treatment impact on ridge gourd features,which were organised under subheadings.

Vine length (cm): The response of ridge gourd to nitrogen application through soil and foliar spray, as well as a combination of both, was studied and the results are presented in Table1. The ANOVA of Table -1 revealed that nitrogen application methods have a major (P0.05) impact on ridge gourd vine duration. T6 (100 kg N ha^{-1} soil-applied+foliar application of urea at 1.5% concentration) produced the longest vines (258.33 cm), followed by T5 (100kg N ha^{-1} soil-applied) and T4 (75 kg N ha^{-1} soil- applied + foliar application of urea at 3.0% concentration), which produced the vines with an average length of 238.67cm. Reduced N doses, i.e. T3 (75 kg N ha^{-1} soil-applied+foliar application of urea at 1.5% concentration) and T2 (75Kg N ha^{-1} soil-applied), resulted in a simultaneous decrease in ridge gourd the vine volume, which was 220.67cm and 198.33cm respectively. As applied to the remainder of the therapies, the LSD test indicated that the variations in the vine duration between T5 and T4 were statistically non-important (P>0.05) and significant (P0.05).

Table 1: Vine length of ridge gourd (cm) as influenced by varying soil-applied N levels and foliar-applied urea concentrations

Treatments	RI	RII	RIII	Mean
T_1= Control	121	112	102	111.67 E
T2=N at 75kg ha^{-1} T2=N at75kg ha^{-1} T2=N at 75kg (soil-applied)	202	198	195	198.33 D
T3= N at 75 kg ha-1 through soil+foliar application of urea at a concentration of 1.5%	221	218	223	220.67 C
T4= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 3.0%	226	229	235	230.00 B
No urea foliar application and T5= N at 100 kg ha^{-1} via soil	226	239	251	238.67 B
T6= N at 100 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5%	255	261	259	258.33 A

S.E.± 5.2655 LSD 0.05 11.732
LSD 0.01 16.688 CV% 3.08

Branches vine^{-1}: The answer of the ridge gourd in terms of branching to nitrogen application through soil and foliar spray was investigated, and the results are presented in Table 2. The ANOVA obtained from the data on branching capability and it revealed that nitrogen application methods had a major (P0.05) impact on the amount of ridge gourd branches vine^{-1}. T6 (100 kg N ha^{-1} soil-applied foliar application of urea at 1.5% concentration) generated the most branches (7.75 vine^{-1}), followed by T4 (75kg N ha-^{1} soil-applied + foliar application of urea at 3.0% concentration) and T5 (100 kg N ha^{-1} soil-applied) with 6.90 and 6.81 average number of branches, respectively. As applied to the remainder of the therapies, the LSD test revealed that the variation in branches vi ne-1 between T5, T4, and T3 were statistically non-significant (P>0.05) and significant (P0.05).

Table 2: Branches vine^{-1} of ridge gourd as influenced by varying soil-applied N levels and foliar-applied urea concentrations

Treatments	RI	RII	RIII	Mean
T_1= Control	3.36	2.15	3.98	3.16 D
T2=N at 75kg ha^{-1} T2=N at75kg ha^{-1} T2=N at75kg Soil-applied	6.06	5.94	5.85	5.95 C
T3= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5%	6.63	6.54	6.69	6.62 B
T4= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 3.0%	6.78	6.87	7.05	6.90 B
No urea foliar application and T5= N at 100 kg ha^{-1} via soil	6.78	6.12	7.53	6.81 B
T6= N at 100 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5%	7.65	7.83	7.77	7.75 A

S.E.± 0.3503 LSD 0.05 0.7804

LSD 0.01 1.1101 CV% 6.92

Fruits vine^{-1}: In the ridge gourd,fruiting potential is a yield contributing feature that has a direct impact on fruit yield per unit area. Table3 shows the effects of nitrogen application methods (soil and foliar) on the amount of fruits generated per plan. The ANOVA on the number of fruits per vine of ridge gourd revealed that nitrogen application methods had an important (P0.05) impact on the number of fruits vine^{-1}. Ridge gourd vines grown under T6 (100kg N ha^{-1} soil- applied + foliar application of urea at 1.5%t concentration) generated the most fruits (11.26 vine^{-1}); followed by ridge gourd crops grown under T5 (100kg N ha^{-1} [soil applied]) and T4 (75 kg N ha^{-1} soil-applied + foliar applica-tion of urea at 3.0% concentration) with 10.96 and 10.41 average fruits, respectively When ridge gourd vines were planted under T3 (75kg N ha^{-1} soil-applied+foliar application of urea at 1.5% concentration and T2 (75kg N ha^{-1} soil-applied], respectively, there was a decrease in fruit number vine^{-1}, with 10.03 and 7.84 fruits, respectively. However, in a T1-planted crop, the lowest number of fruits (5.71 vine^{-1}) was observed (control).

The effect of foliar urea application on this ridge parameter was significant, particularly at higher urea concentrations. The LSD test revealed that the discrepancies in fruits vine^{-1} between T6 and T5 or between T4 and T3 were (100kg N ha^{-1} satistically non-significant (P>0.05) and significant (P0.05) as opposed to other treatments, but the higher urea concentrations (3.00percent) in addition to 100 kg soil added N proved to be a superior treatment mix.

Table 3: Fruits vine^{-1} of ridge gourd as influenced by varying soil-applied N levels and foliar-applied urea concentrations

Treatments	RI	RII	RIII	Mean
T_1= Control	6.02	5.65	5.47	5.71 D
T2=N at 75kg ha^{-1} T2=N at 75kg ha^{-1} T2=N at75kg (soil-applied)	7.65	7.45	8.42	7.84 C
T3= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5%	10.67	9.65	9.77	10.03 B
T4= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 3.0%	10.92	10.06	10.25	10.41 B
No urea foliar application and T5= N at 100 kg ha^{-1} via soil	10.92	10.85	11.12	10.96 A
T6= N at 100 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5%	10.65	11.61	11.51	11.26 A

S.E.± 0.3722 LSD 0.05 0.8294
LSD 0.01 1.1798 CV% 4.87

Weight of single ridge gourd fruit (g): In ridge gourd, a single fruit's weight has a linear effect on the final yield per unit area. Table 4 shows details on the weight of single ridge gourd fruit as a function of nitrogen application by soil and foliar methods.The ANOVA on ridge gourd single fruit weight data revealed that various nitrogen application methods had a major (P0.05) effect on the weight of single ridge gourd fruit. T6 (100kg N ha^{-1} soil-applied+foliar application of urea at 1.5% concentration) ridge gourd vines produced heavier fruits (281.38g), followed by 274.10g and 260.22 g average weight of ridge gourd fruit in T5 (100 kg N ha^{-1} soil-applied) and T4 (75 kg N ha^{-1} soil-applied + foliar application of urea at 3.0% concentration When the ridge gourd vines were planted under T3 (75kg N ha^{-1} soil-applied + foliar application of urea at 1.5% concentration) and T2 75kg N ha^{-1} soil-applied), the average single fruit weight decreased to 250.22g and 195.99g, respectively. However, the crop planted under T1 had the smallest average fruit weight (142.83g) (Control). T6 seemed to have the highest single fruit weight, led by T5 and T4, but statisti-cally, the variations in average single fruit weight were non-significant (P>0.05) between these treatme-nts owing to the higher coefficient of variance. However, it was discovered that foliar application of urea at a higher concentration (3.0%) was needed to achieve a higher single fruit weight of ridge gourd.

Table 4: Single fruit weight (g) of ridge gourd as influenced by varying soil-applied N levels and foliar-applied urea concentrations

Treatments	RI	RII	RIII	Mean
T_1= Control	150.5	141.25	136.75	142.83 D

T2=N at 75kg ha^{-1} T2=N at 75kg ha^{-1} T2=N at 75kg soil-applied	191.25	161.25	235.46	195.99 C
T3= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5 percent	266.86	216.25	269.27	250.79 B
T4= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 3.0%	272.9	276.52	231.25	260.22 A
No urea foliar application and T5= N at 100 kg ha^{-1} via soil	272.9	246.33	303.08	274.10 A
T6= N at 100 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5 percent	216.25	315.16	312.74	281.38 A

S.E.± 6.490 LSD 0.05 21.48
LSD 0.01 27.29 CV% 14.90

Fruits weight vine^{-1} (kg): The ANOVA extracted from the data on ridge gourd fruits weight per vine Table-5 revealed that nitrogen application methods had a substantial (P0.05) impact on the fruits weight vine^{-1}. The ridge gourd vines cultivated under T6 (100 kg N ha^{-1} soil-applied + foliar application of urea at 1.5% concentration) developed heavier fruits (3.25 kg vine^{-1}), followed by 3.03kg and 2.90kg vine^{-1} in the ridge gourd crop cultivated under T5 (100 kg N ha^{-1} soil-applied) and T4 (75kg N ha^{-1} soil-applied + foliar application of urea at 3.0%) When ridge gourd vines were grown in T3 (75kg N ha^{-1} soil-applied + foliar application of urea at 1.5% concentration) and T2 (75kg N ha^{-1} soil-applied), the average weight of fruits vine^{-1} was 2.40kg and 1.93kg respectively.

Table 5: Fruit weight vine^{-1} (kg) of ridge gourd as influenced by varying soil-applied N levels and foliar-applied urea concentrations

Treatments	RI	RII	RIII	Mean
T_1= Control	1.21	1.25	1.44	1.30 D
T2=N at 75kg ha^{-1} T2=N at 75kg ha^{-1} T2=N at 75kg soil-applied	1.98	1.88	1.92	1.93 C
T3= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5%	2.45	2.34	2.41	2.40 B
T4= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 3.0%	2.98	3.06	2.65	2.90 A
No urea foliar application and T5= N at100 kg ha^{-1} via soil	2.98	3.02	3.1	3.03 A
T6= N at 100 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5%	2.87	2.97	3.91	3.25 A

S.E.± 0.2167 LSD 0.05 0.3329
LSD 0.01 0.4868 CV% 10.76

Fruits yield plot^{-1} (kg): Table 6 shows the impact of nitrogen application methods (soil and foliar) on fruit yield per map. The study of variance obtained from data on ridge gourd fruit yield Table 6 revealed a major (P0.05) impact of nitrogen application methods on plot^{-1} fruit yield.

Table 6: Fruit yield plot^{-1} (kg) of ridge gourd as influenced by varying soil-applied N levels and foliar-applied urea concentrations

Treatments	RI	RII	RIII	Mean
T_1= Control	10.83	11.19	12.89	11.64 F
T2=N at 75 kg ha^{-1} T2=N at 75kg ha^{-1} T2=N at75kg soil-applied	17.72	16.83	17.18	17.24 E
T3= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5%	21.93	20.94	21.57	21.48 D
T4= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 3.0%	26.66	27.37	23.72	25.92 C
No urea foliar application and T5= N at 100kg ha^{-1} via soil	26.66	26.63	32.89	28.73 B
T6= N at 100 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5%	38.33	35.56	35.02	36.30 A

S.E.± 1.6548 LSD 0.05 3.6870
LSD 0.01 5.2444 CV% 8.61

Fruits yield ha^{-1} (kg): Table 7 shows the impact of nitrogen application methods (soil and foliar) on ridge gourd fruit yield ha^{-1}.The variations in ridge gourd yield ha^{-1} caused by different nitrogen application methods is statistically important (P0.05) according to the study of variance shown in Table-7. The highest fruit yield (14520.55kg ha^{-1}) was achieved in the ridge gourd crop cultivated under T6 (100kg N ha^{-1} oil-applied +foliar application of urea at 1.5% concentration), followed by 11490.26kg and 10366.90 kg ha^{-1} in the ridge gourd crop cultivated under T5 (100 kg N ha^{-1} soil-applied) and T4 (75kg N ha^{-1} soil-applied+When the ridge gourd crop was cultivated under T3 (75kg N ha^{-1} soil-applied+foliar application of urea at 1.5% concentration) and T2 (75kg N ha^{-1} soil-applied) respectively, the yield was significantly reduced to 8592.00kg and 6897.47kg ha^{-1} respectively.

Table 7: Fruit yield ha^{-1} (kg) of ridge gourd as influenced by varying soil-applied N levels and foliar-applied urea concentrations

Treatments	RI	RII	RIII	Mean
T_1= Control	4331.8	4475	5155.2	4654.00E
T2=N at 75kg ha^{-1} T2=N at 75kg ha^{-1} T2=N at 75kg soil-applied	7088.4	6730.4	6873.6	6897.47D
T3= N at 75 kg ha^{-1} through soil+foliar application of urea at a concentration of 1.5 percent	8771	8377.2	8627.8	8592.00C
T4= N at 75kg ha^{-1} through soil+foliar application of urea at a concentration of 3.0%	10664.34	10949.35	9487	10366.90B
No urea foliar application and T5= N at 100kg ha^{-1} via soil	10664.34	10652.22	13154.21	11490.26B
T6= N at 100 kg ha-1 through soil+foliar application of urea at a concentration of 1.5%	15332.32	14223.23	14006.09	14520.55 A

S.E.± 661.89 LSD 0.05 1474.8
LSD 0.01 2097.70 CV% 8.61

DISCUSSION

Conventional fertilization may be adjusted due to water scarcity and drought conditions.It has been discovered that applying urea to the leaves not only meets the plant's immediate nitrogen needs, but also compensates for drought damage (Akter et al., 2010). Asia result, an experiment was conducted to determineithe impactiof nitrogen application methods on ridge gourd growth and yield, with 06 treatments consisting of various soil and foliar N combinations.

The findings showed that various nitrogen application approaches had a major impact on all of the ridge gourd parameters calculated in this analysis (P0.05). With 258.33cm plant height, 7.75 branches plant^{-1}, 11.26 fruits plant^{-1}, 281.38 g average single-fruit weight, 3.25kg weight of ridge gourd fruit per vine, 36.30kg ridge gourd fruit yield plot^{-1}, and 14520.55kg ridge gourd fruit yield ha^{-1}, ridge gourd vines planted under T6 (N at 100kg ha^{-1} by soil+foliar application of urea at 1.5% concentration) rated first With both vine growth and ridge gourd yield traits, the ridge gourd crop fertilised with Nat 100kg ha^{-1} through soil came in second, followed by N at 75kg ha^{-1} through soil+foliar application of iurea at 3.0 percent concentration, N at 75kg ha^{-1} through soil +foliar application of urea at 1.5% concentration, and N at 75kg ha^{-1} through soil without foliar urea. All of the characteristics tested rated the control plots lowest. It was found that when ridge gourds were given foliar urea at a concentration of 1.5% in addition to soil-applied N at 100kg ha^{-1}, plant growth and fruiting were substantially increased, and the fruit yield was significantly higher than the vines were holding solely on soil-applied N at 100kg ha^{-1}. For a produc- tive ridge gourd crop yield, ridge gourd growers can apply foliar urea at 1.5 to 3.0% concentration in addition tor 100kg ha^{-1} soil-added N. Many previous scholars have corporated the findings of the current report. Abbas et al., (2020) recorded incre-ased crop growth and yield after applying different concen-trations of fertiliser solutions in foliar shape.

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