Original Research Article

A study on soil nutrient status and nutrient uptake of summer groundnut under pressurized irrigation

ABSTRACT

Aims: To study the nutrient uptake and status of available nutrients in soil after harvest of groundnut as affected by different irrigation levels and methods.

Study design: The experiment was laid out in randomized block design with different irrigation levels and methods replicated thrice.

Place and Duration of Study:AICRP on Groundnut, Main Agricultural Research Station, University of Agricultural Sciences, Dharwad during summer season of 2021.

Methodology: We took 11 treatments involving different level and methods of irrigation using eight micro-sprinkler treatments, one drip fertigation treatment and two flood irrigation treatments. We carried out laboratory analysis of the soil samples for soil nutrient status and nutrient uptake of the crop after harvest.

Results: Significantly higher total nitrogen, phosphorus and potassium uptake were recorded with drip irrigation applied at 0.6 ET0 at Seedling, 1.0 ET0 at Flowering, 1.25 ET0 at Pegging, 0.8 ET0 at Pod formation stages along with fertigation of N and P [3 splits at NF on 3rd, 4th and 5th week] and CaNO3 and S nutrients [3 splits at PGF on 7th, 8th and 9th week] (164.0, 27.6 and 129.3 kg ha^{-1}, respectively) and was 40.0, 55.43 and 25.91 per cent higher compared to control (Flood FAO). Same treatment enhanced the soil chemical properties like pH, EC and organic carbon by 1.04, 16.12 and 7.40 per cent compared to control.

Conclusion: Drip irrigation and fertigation enhanced nutrient uptake of groundnut and available soil nutrient status and also improved soil chemical properties as compared to control (Flood irrigation). So, this method can be proved beneficial in reducing the nutrient requirement of the crop under cultivation in the Northern Transitional Zone of Karnataka.

Keywords: Drip, micro-sprinkler, groundnut, nutrient uptake

1. INTRODUCTION

Oilseed crops are the second most important determinant of agricultural economy, next only to cereals within the segment of field crops. In India, groundnut (*Arachis hypogaea* L.) is a significant oilseed and supplemental food crop. When it comes to sources of vegetable protein (26%) and edible oil (46–51%), groundnut is the third most significant crop. On an equivalent basis, groundnuts have 2.5 times more protein than eggs and 2 times more than beef. Groundnut also has a good supply of calcium, phosphorus, iron, zinc, and boron. In addition to being high in calories, groundnuts also provide minor levels of vitamin B complex and vitamin E. Because of these qualities, groundnut is referred to as the "King of Oilseeds". Globally, Groundnut covers 32.7 million hectares with the production of 53.9 million tonnes with the productivity of 1648 kg per hectare (FAOSTAT, 2021) [1]. India produced 87 lakh tons of groundnut from an area of 57.05 lakh hectares with an average productivity of 1500 kg per hectare during 2021-22 (USDA, 2023) [2].

Comment [PT1]: Why this?

Comment [PT2]: Why this? Use the appropriate style

Soil moisture is the key limiting factor for the higher yield of groundnut during dry seasons. Therefore, there is need for effective strategies to maximize the water use efficiency from the limited water utilized for the crop growth. Among the other issues, indiscriminate use of water and chemical fertilizers has led to environmental issues, such as groundwater contamination and atmospheric nitrous oxide release. So, proper management of water and nutrients in essential in dry arid and semi-arid regions.

Micro-irrigation has been widely investigated as a valuable and sustainable production strategy in dry regions. Drip or trickle irrigation is a type of micro irrigation system that has the potential to save water and nutrients by allowing water to drip slowly to the roots of plant. At various crop growth phases, drip-based fertigation offers a range of diverse nutrient treatments. Additionally, periodic fertigation applications of the nutrients ensure continual nutritional availability. The potential yield of groundnuts can be increased while conserving water and nutrients by strategically applying water at important physiological growth phases in response to moisture constraint throughout the summer (Patra *et al.,* 1998) [3].

So, keeping in view the above facts, the present experiment was planned and carried out to study the nutrient uptake and available soil nutrient status after crop harvest under different irrigation treatments.

2. MATERIAL AND METHODS

The experiment was carried out at AICRP on Groundnut, University of Agricultural Sciences, Dharwad. The experimental site is located at 15029'47.4" N latitude and 74059'32.1" E longitude and at an altitude of 678 m above mean sea level. Dharwad comes under Northern Transition Zone (Zone-VIII) of Karnataka which lies between the Western Hilly Zone (Zone-IX) and Northern Dry Zone (Zone-III).

Monthly maximum (35.4^{0}C) and minimum temperature (15.2 ^{0}C) was noticed during April and February months, respectively. Rainfall received during the cropping period of groundnut (28th Jan 2021 to 30th May, 2021) was 245.6 mm and effective rainfall was 115.2 mm during different phenological stages. Maximum evaporation during the cropping period was in the month of March (205.6 mm) and minimum evaporation was in the month of (120.1 mm).

Soil was clay in texture with basic pH (7.62), electrical conductivity of 0.30 dS m^{-1}, low in available nitrogen (258.7 kg ha^{-1}), medium in available P_2O_5 (29.8 kg ha^{-1}) and high available K_2O (334.9 kg ha^{-1}).

The experiment was laid out in randomized block design having eight micro-sprinkler irrigation treatments viz. T1- Sprinkler method (50 mm depth of irrigation at all stages except 60 mm depth at 50 and 60 DAS), T2- 80% of T1 Treatment, T3- 70% of T1 Treatment, T4- 60% of T1 Treatment, T5- 50% of T1 Treatment, T6- 70% of T1 Treatment + Foliar application of 0.5% KNO_3 at 50 DAS, T7- 60% of T1 Treatment + Foliar application of 0.5% KNO_3 at 40 and 60 DAS, T8- 50% of T1 Treatment + Foliar application of 0.5% KNO_3 at 30, 50 and 70 DAS, one drip irrigation treatment viz. Drip method of irrigation at 0.6 ET_0 (Seedling), 1.0 ET_0 (Flowering), 1.25 ET_0 (Pegging) and 0.8 ET_0 (Pod formation) + fertigation of N and P [3 splits at nodule formation on 3rd, 4th and 5th week] + CaNO3 and S nutrients [3 splits at peg formation on 7th, 8th and 9th week] and two flood irrigation treatments viz. Flood irrigation at 0.45 ET_0 (Seedling), 0.75 ET_0 (Flowering), 1.05 ET_0 (Pegging), 0.70 ET_0 (Pod Formation) (FAO) and irrigation as per UAS POP (Irrigating at 25,40,55,70,and 85 DAS at 60 mm depth) replicated thrice. Irrigation in drip plots was done based on actual evapotranspiration at 4 days interval. Irrigation was applied as per treatments based on deficit water supply at 15, 30, 40, 50, 60, 70, 80 and 90 days after emergence (DAE) in micro-sprinkler irrigated plots. In flood irrigation as per FAO recommendation, irrigation was provided based on actual evapotranspiration depending on growth stage and in flood irrigation as per UAS package of practice, irrigation was provided at 25, 40, 55, 70 and 85 DAS with 60 mm depth at each irrigation. The irrigation provided uniformly to all treatments up to establishment. There was continuous rainfall from 10th April till harvest, so, irrigation was either skipped or adjusted as per treatment requirement.

The actual evapotranspiration was calculated by using the following formula given by Choudhary and Kadam (2006) [4] as,ETo = Kp ×Ep, where, ETo= Actual evapotranspiration, Kp= Pan coefficient (0.70) and Ep= Daily pan evaporation (mm)

Groundnut variety ‘Kadiri Lepakshi’ was sown using 125 kg/ha seed rate sown at a spacing of 30 cm x 10 cm (Row to row: 30 cm and plant to plant: 10 cm). Two weeks prior to sowing, farm yard manure at 7.5 t ha^{-1} was administered to all treatments. According to the recommended package of practice (RPP), all the treatment plots received a basal application of N, P, and K (25 kg N, 46 kg P_2O_5 and 25 kg K_2O ha^{-1}) as well as gypsum at flowering and pegging stages with 500 kg ha 1. Fertigation of fertigation of N and P [3 splits at NF on 3rd, 4th, and 5th week] and 3 splits of Calcium and Sulphur at peg formation stage (on 7th, 8th, and 9th week) in the form of water soluble forms of $Ca(NO_3)_2$ and sulphur granules by hand application are used for drip plots.`

2.1. Nutrient uptake

Dried plant samples were powdered in a Willey mill and passed through 40-mesh sieve to considerable fineness before storing them in polythene bags for further analysis. The nutrient uptake was calculated using the following formula and expressed in kilogram per hectare.

$$\text{Nutrient uptake (kg ha}^{-1}\text{)} = \frac{\text{Nutrient concentration (\%)} \times \text{Total biomass (kg ha}^{-1}\text{)}}{100}$$

Table 1. Methods of soil analysis in laboratory:

Parameters	Methods	References
pH	pH meter	Piper,1962 [5]
EC (dSm^{-1})	Conductivity method	Jackson, 1973 [6]
Soil organic carbon (%)	Wet oxidation method	Walkley and Black (Jackson, 1973) [6]
Available N (kg ha^{-1})	Alkaline $KMnO_4$ distillation method	Saharawat and Buford (1982) [7]
Available P_2O_5 (kg ha^{-1})	Olsen's method (Sparks, 1996)	Jackson, 1973[6]
Available K_2O (kg ha^{-1})	Flame photometer method (Sparks, 1996)	Jackson, 1973 [6]

Comment [PT3]: To ensure repeatability of the study, provide a brief details of the methods employed.

2.2. Statistical analysis

Plant and soil samples were analyzed in laboratory and plant nutrient uptake and soil nutrient status were estimated and subjected to statistical analysis by adopting Fischer's method of analysis of variance and the mean values of treatments were then subjected to Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984) [8]. The critical difference values given in the table at 5 per cent level of significance were used.

Comment [PT4]: What software did you use for the analysis?

3. RESULTS AND DISCUSSION

3.1. NUTRIENT UPTAKE

The results on nutrient uptake presented in table 2 reveal hat significantly higher total nitrogen, phosphorus and potassium uptake were recorded with drip irrigation applied at 0.6 ET_0at seedling, 1.0 ET_0at flowering, 1.25 ET_0at pegging, 0.8 ET_0at pod formation stages along with fertigation of N and P [3 splits at NF on 3rd, 4th and 5th week] and $CANO_3$ and s nutrients [3 splits at PGF on 7th, 8th and 9th week] (164.0, 27.6 and 129.3 kg ha^{-1}, respectively) and was 40.0, 55.43 and 25.91 per cent higher compared to control (flood FAO) and 22.26, 24.27 and 13.53 per cent higher compared to sprinkler with 50 mm irrigation depth (Table 2). Similarly, providing irrigation at 100 % ETcto groundnut significantly increased the total nitrogen uptake (232.84 kg ha^{-1}), total phosphorus uptake (23.66 kg ha^{-1}) and total potassium uptake (87.79 kg ha^{-1}) by the crop was reported by Shinde (2020) [9]. Similar results were reported by Chandini *et al.* (2022) [10] who found that significantly higher N, P and K uptake of plant (104.2, 11.8 and 54.3 kg ha^{-1}, respectively) was recorded with irrigation scheduled at IW/CPE ratio of 1.0 along with Kadiri Lepakshi compared to the other treatments. This was in conformity with the results reported by Sanju *et al.* (2014) [11], Maurya *et al.* (2017) [12] Jain *et al.* (2018) [13].

TABLE 2. EFFECT OF DIFFERENT IRRIGATION LEVELS AND METHODS ON MAJOR NUTRIENT UPTAKE OF GROUNDNUT AT HARVEST

Treatments	Major nutrient uptake (kg ha^{-1})			Total nutrient (NPK) uptake (kg ha^{-1})
	N	P	K	
T_1	127.5 ^{b}	20.9 ^{b}	111.8 ^{b}	260.2 ^{b}
T_2	121.3 ^{bc}	19.0 ^{bc}	108.6 ^{b}	248.9 ^{bc}
T_3	115.2 ^{bcde}	16.9 ^{cd}	104.2 ^{bc}	236.3 ^{cde}
T_4	105.9 ^{def}	15.5 ^{d}	101.8 ^{bc}	223.2 ^{ef}
T_5	97.4 ^{f}	12.2 ^{e}	93.4 ^{c}	203.0 ^{g}
T_6	119.5 ^{bcd}	19.1 ^{bc}	109.7 ^{b}	248.3 ^{bc}
T_7	114.8 ^{bcde}	18.2 ^{c}	107 ^{b}	240.0 ^{cd}
T_8	109.7 ^{cdef}	17.1 ^{cd}	101.5 ^{bc}	228.3 ^{de}
T_9	164 ^{a}	27.6 ^{a}	129.3 ^{a}	320.9 ^{a}
T_{10}	98.4 ^{f}	12.4 ^{e}	95.8 ^{c}	206.6 ^{g}
T_{11}	100.4 ^{ef}	12.3 ^{e}	96.2 ^{c}	208.9 ^{fg}
S.Em±	**4.6**	**0.7**	**3.3**	**5.2**

T_1 -Sprinkler irrigation (SI) (50 mm except 60 mm at 50 and 60 DAS)
T_2 -SI (40 mm except 48 mm at 50 and 60 DAS) i.e. 80 % of T_1
T_3 -SI (35 mm except 42 mm at 50 and 60 DAS) i.e. 70 % of T_1
T_4 -SI (30 mm except 35 mm at 50 and 60 DAS) i.e. 60 % of T_1
T_5 -SI (25 mm except 30 mm at 50 and 60 DAS) i.e. 50 % of T_1
T_6 -SI (35 mm except 42 mm at 50 and 60 DAS) + FA of 0.5 % KNO_3 at 50 DAS
T_7 –SI (30 mm except 25 mm at 50 and 60 DAS)+ FA of 0.5 % KNO_3 at 40 and 60 DAS
T_8 -SI (25 mm except 30 mm at 50 and 60 DAS)+ FA of 0.5 % KNO_3 at 30, 50 and 70 DAS
T_9 -DI at 0.6 ET_0 (S), 1.0 ET_0 (F), 1.25 ET_0 (P) and 0.8 ET_0 (PF) + fertigation of N and P [3 splits at NF on 3rd, 4th and 5th week] + $CaNO_3$ and S nutrients [3 splits at PGF on 7th, 8th and 9th week]
T_{10} -Flood irrigation at 0.45 ET_0 (S), 0.75 ET_0 (F), 1.05 ET_0 (P), 0.70 ET_0 (PF) (FAO recommendation)
T_{11} – Irrigation as per UAS POP (Irrigating at 25, 40, 55, 70 and 85 DAE at 60mm depth)
SI= Sprinkler Irrigation; FA= Foliar Application; DI= Drip Irrigation; S = Seedling; F = Flowering; P= Pegging; PF = Pod Formation; NF = Nodule formation; PGF= Peg formation

Higher nutrient uptake in drip irrigation with fertigation was mainly due to application of controlled water near the crop root zone thus providing conditions for vigorous root development which helped in better water and nutrient uptake by the crop and higher root initiation with three equal splits caused significant differences in nutrient uptake pattern.This is due to the split application of nutrients, which may have improved the solubility of nutrients, leading to better nutrient availability in the crop root zone and resulted in higher root activity and thus improving nutrient uptake.

Among the sprinkler treatments, nutrient uptake was significantly lower in case of treatment receiving 25 mm irrigation depth (97.4, 12.2 and 93.4 kg ha^{-1} nitrogen, phosphorus and potassium uptake, respectively) and the per cent decrease from sprinkler irrigation with 50 mm irrigation depth was 23.6, 41.6 and 16.5 per cent for nitrogen, phosphorus and potassium uptake. Similarly, Meti *et al.* (2004) [14] reported that nitrogen, phosphorus, potassium and sulphur uptake increased from 88.64 to 191.17 kg N ha^{-1}, 8.34 to 9.05 kg P ha^{-1}, 60.59 to 65.34 kg K ha^{-1} and 8.86 to 10.01 kg S ha^{-1}, respectively by increasing water application rate through irrigation scheduling at 0.8 to 1.0 IW/CPE ratio.This was due to lower water availability in crop root zone reducing nutrient mobility and uptake by the crop plant. However, sprinkler treatments with foliar spray of KNO_3 performed better in terms of nutrient uptake.

3.2. Soil chemical properties and available nutrient status after harvest of groundnut

3.2.1. Soil chemical properties

The soil pH, electrical conductivity (EC) and organic carbon content did not differ significantly under different irrigation levels at harvest of groundnut. However, pH ranged from 7.63 to 7.71, EC from 0.26 to 0.31 dS m^{-1} and soil organic carbon content from 5.0 to 5.4 mg kg^{-1} (Table 3). However, drip irrigation applied at 0.6 ET_0 at Seedling, 1.0 ET_0 at Flowering, 1.25 ET_0 at Pegging, 0.8 ET_0 at Pod formation stages along with fertigation of N and P [3 splits at NF on 3rd, 4th and 5th week] and $CaNO_3$ and S nutrients [3 splits at PGF on 7th, 8th and 9th week] recorded numerically higher soil chemical properties and enhanced the pH, EC and organic carbon by 1.04, 16.12 and 7.40 per cent compared to control which indicated the role of drip fertigation in enhancing chemical properties of soil. Higher soil organic carbon in the drip fertigation treatment was due to the increasingavailability of N, P and K in soil with congenial soil moistureregime as a result of drip fertigation which might have increased thesoil microbial activity leading to increased levels of soil organic carbon (Salvin, 1999 [15]; Kavino *et al.*,2004 [16]).

3.2.4 Available nutrient status in soil (kg ha^{-1})

The data pertaining to available major nutrients (nitrogen, phosphorus and potassium) in soil after at harvest of groundnut as influenced by different levels of irrigation are given in Table 4.

The influence of different irrigation levels had failed to show significant difference on soil available nitrogen, phosphorus and potassium. However, it ranged from 255.73 to 283.62 kg ha^{-1} for nitrogen. Whereas, it ranged from 28.47 to 29.84 kg $ha^{-1}$for available phosphorus and range of soil available potassium was 350.39 to 355.49 kg $ha^{-1}$for different treatments after harvest of the crop. Similarly, Saha and Gunri (2014) [17] noticed that irrigation scheduling at 1.0 IW/CPE ratio in summer groundnut recorded significantly higher available soil nitrogen (445.38 kg ha^{-1}) compared to irrigation regimes of 0.8 and 0.6 IW/CPE ratio.

Available nitrogen, phosphorus and potassium in soil at harvest of groundnut did not differ significantly due to different irrigation levels. However, major nutrient availability was numerically higher with drip irrigation applied at 0.6 ET0 (S), 1.0 ET0 (F), 1.25 ET0 (P), 0.8 ET0 (PF) stages i.e., 7.87, 4.26 and 1.35 per cent higher compared to control (Flood FAO) (Table 4). This was mainly due to split of application of nitrogen, phosphorus and potassium in drip fertigation treatment.

TABLE 3. EFFECT OF DIFFERENT IRRIGATION LEVELS AND METHODS ON SOIL PH, ELECTRICAL CONDUCTIVITY (EC) AND ORGANIC CARBON (OC) AFTER HARVEST OF GROUNDNUT

Treatments	pH	EC (d Sm^{-1})	OC (mg kg^{-1})
T_1	7.70 [a]	0.31 [a]	5.3 [a]
T_2	7.68 [a]	0.30 [a]	5.2 [a]
T_3	7.67 [a]	0.28 [a]	5.1 [a]
T_4	7.66 [a]	0.27 [a]	5.0 [a]
T_5	7.64 [a]	0.27 [a]	5.0 [a]
T_6	7.67 [a]	0.28 [a]	5.2 [a]
T_7	7.66 [a]	0.28 [a]	5.2 [a]
T_8	7.64 [a]	0.28 [a]	5.0 [a]
T_9	7.71 [a]	0.31 [a]	5.4 [a]
T_{10}	7.63 [a]	0.26 [a]	5.0 [a]
T_{11}	7.64 [a]	0.26 [a]	5.0 [a]
S.Em±	**0.13**	**0.02**	**0.32**

T_1 -Sprinkler irrigation (SI) (50 mm except 60 mm at 50 and 60 DAS)
T_2 -SI (40 mm except 48 mm at 50 and 60 DAS) i.e. 80 % of T_1
T_3 -SI (35 mm except 42 mm at 50 and 60 DAS) i.e. 70 % of T_1
T_4 -SI (30 mm except 35 mm at 50 and 60 DAS) i.e. 60 % of T_1
T_5 -SI (25 mm except 30 mm at 50 and 60 DAS) i.e. 50 % of T_1
T_6 -SI (35 mm except 42 mm at 50 and 60 DAS) + FA of 0.5 % KNO_3 at 50 DAS
T_7 –SI (30 mm except 25 mm at 50 and 60 DAS)+ FA of 0.5 % KNO_3 at 40 and 60 DAS
T_8 -SI (25 mm except 30 mm at 50 and 60 DAS)+ FA of 0.5 % KNO_3 at 30, 50 and 70 DAS
T_9 -DI at 0.6 ET_0 (S), 1.0 ET_0 (F), 1.25 ET_0 (P) and 0.8 ET_0 (PF) + fertigation of N and P [3 splits at NF on 3rd, 4th and 5th week] + $CaNO_3$ and S nutrients [3 splits at PGF on 7th, 8th and 9th week]
T_{10} -Flood irrigation at 0.45 ET_0 (S), 0.75 ET_0 (F), 1.05 ET_0 (P), 0.70 ET_0 (PF) (FAO recommendation)
T_{11} – Irrigation as per UAS POP (Irrigating at 25, 40, 55, 70 and 85 DAE at 60mm depth)

SI= Sprinkler Irrigation; FA= Foliar Application; DI= Drip Irrigation; S = Seedling; F = Flowering; P= Pegging; PF = Pod Formation; NF = Nodule formation; PGF= Peg formation

TABLE 4. EFFECT OF DIFFERENT IRRIGATION LEVELS AND METHODS ON AVAILABLE NUTRIENTS AFTER HARVEST OF GROUNDNUT

Treatments	N (kg ha^{-1})	P (kg ha^{-1})	K (kg ha^{-1})
T_1	280.82^{ab}	29.74^{a}	354.83^{a}
T_2	278.33^{ab}	29.37^{a}	353.79^{a}
T_3	269.67^{ab}	29.07^{a}	352.73^{a}
T_4	264.10 ^{ab}	28.64^{a}	351.85^{a}
T_5	255.73^{b}	28.47^{a}	350.39^{a}
T_6	272.46^{ab}	29.20 ^{a}	352.79^{a}
T_7	269.67^{ab}	28.98^{a}	351.86^{a}
T_8	264.09^{ab}	28.57^{a}	350.86^{a}
T_9	283.62^{a}	29.84^{a}	355.49^{a}
T_{10}	261.30 ^{ab}	28.57^{a}	350.69^{a}
T_{11}	264.09^{ab}	28.74^{a}	351.00^{a}
S.Em±	**7.36**	**0.78**	**5.55**

T_1 -Sprinkler irrigation (SI) (50 mm except 60 mm at 50 and 60 DAS)
T_2 -SI (40 mm except 48 mm at 50 and 60 DAS) i.e. 80 % of T_1
T_3 -SI (35 mm except 42 mm at 50 and 60 DAS) i.e. 70 % of T_1
T_4 -SI (30 mm except 35 mm at 50 and 60 DAS) i.e. 60 % of T_1
T_5 -SI (25 mm except 30 mm at 50 and 60 DAS) i.e. 50 % of T_1
T_6 -SI (35 mm except 42 mm at 50 and 60 DAS) + FA of 0.5 % KNO_3 at 50 DAS
T_7 –SI (30 mm except 25 mm at 50 and 60 DAS)+ FA of 0.5 % KNO_3 at 40 and 60 DAS
T_8 -SI (25 mm except 30 mm at 50 and 60 DAS)+ FA of 0.5 % KNO_3 at 30, 50 and 70 DAS
T_9 -DI at 0.6 ET_0 (S), 1.0 ET_0 (F), 1.25 ET_0 (P) and 0.8 ET_0 (PF) + fertigation of N and P [3 splits at NF on 3rd, 4th and 5th week] + $CaNO_3$ and S nutrients [3 splits at PGF on 7th, 8th and 9th week]
T_{10} -Flood irrigation at 0.45 ET_0 (S), 0.75 ET_0 (F), 1.05 ET_0 (P), 0.70 ET_0 (PF) (FAO recommendation)
T_{11} – Irrigation as per UAS POP (Irrigating at 25, 40, 55, 70 and 85 DAE at 60mm depth)

SI= Sprinkler Irrigation; FA= Foliar Application; DI= Drip Irrigation; S = Seedling; F = Flowering; P= Pegging; PF = Pod Formation; NF = Nodule Formation; PGF= Peg Formation

4. CONCLUSION

From the present investigation, it can be concluded that highest nutrient uptake was recorded in drip irrigation and fertigation treatment and was significantly higher than control flood irrigation. There was no significant differences among the treatments for soil chemical properties and available major nutrients in soil at harvest of groundnut but the values were numerically higher in drip fertigation treatment. So, micro-irrigation strategies, particularly, drip irrigation and fertigation can be a solution for improving crop nutrient uptake and improved nutrient status in soil thus reducing the use of excessive amount of water and nutrients in crops and help in improving crop productivity through optimized supply of resources in the crop root zone.

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