

Improving productivity of groundnut (*Arachis hypogaea*) by using water soluble fertilizer through drip irrigation

N.K. JAIN¹ AND H.N. MEENA²

ICAR-Directorate of Groundnut Research, Junagadh, Gujarat 362 001

Received : August 2013; Revised accepted : March 2015

ABSTRACT

A field experiment was conducted during the summer seasons of 2011 and 2012 at Junagadh, Gujarat to improve productivity of groundnut (*Arachis hypogaea* L.) by using water soluble fertilizer through drip irrigation. Results indicated that maximum SPAD chlorophyll meter reading (SCMR) was recorded with the application of water soluble fertilizer through drip irrigation @ 150 kg/ha at 50 DAS, while dry matter accumulation/plant, plant height and number of nodules/plant (at 75 DAS) were found higher in the treatment receiving water soluble fertilizer @ 226.5 kg/ha through drip irrigation. Similarly, number and weight of mature pods/plant, 100-kernel weight and shelling out-turn were also recorded higher with water soluble fertilizer @ 226.5 kg/ha through drip irrigation. Maximum pod yield (2.67 t/ha), haulm yield (4.96 t/ha), kernel yield (1.82 t/ha), oil content (50.3%), oil yield (0.92 t/ha), protein yield (0.50 t/ha) and nutrient uptake (200.1 kg NPKB/ha) were recorded with the application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha. This treatment also gave maximum net returns (50.9 × 10³ ₹/ha) and water productivity (787 g/m³), while maximum benefit: cost ratio (2.42) was obtained under recommended dose of fertilizers (25 kg N, 22 kg P and 24.9 kg K/ha) fb check basin method of irrigation. After harvesting of groundnut, maximum actual N (36.0 kg/ha), P (8.5 kg/ha) and K (31.4 kg/ha) gains were recorded in the treatment receiving water soluble fertilizer @ 250 kg/ha through drip irrigation compared to all other treatments. Application of water soluble fertilizers through drip also saved 36–38% water over check basin method of irrigation.

Key words : Fertigation, Groundnut, Water Productivity, Water soluble fertilizer, Yield

In India, groundnut is one of the important oilseed crop and occupies an area of 4.77 M ha with the production of 4.75 M tonnes and productivity of 996 kg/ha (2012–13), which is quite low as compared to USA (»3500 kg/ha) and China (»3000 kg/ha). Among the various factors that limit the productivity of groundnut, judicious management of available soil moisture and nutrients is crucial for improving the crop productivity. The irrigation can give maximum benefits to the crop only if supply of nutrients during plant growth is maintained in the soil and vice-versa is also true. Development of appropriate water-management technologies to maximize the crop productivity per drop of water is the need of hour. Micro-irrigation is introduced primarily to save water and increase the water use efficiency in agriculture. There is reduction in water consumption by 30–70% by use of drip system over surface method with a concomitant gain in productivity by 20–

30% for different crops (Thind *et al.*, 2008; Singh *et al.* 2009; and Jayakumar *et al.*, 2014). Resource-use efficiency and yield can be further improved by fertigation where in plant nutrients are given along with irrigation water, mainly through drip system (Jat *et al.*, 2011). Fertigation is relatively a recent innovative method, by which fertilizers are applied along with irrigation water through drip system to enhance fertilizer-use efficiency besides increasing the crop yields. Studies shows that drip irrigated groundnut had greater yield, market grade, and gross revenue compared with non-irrigated regimes (Sorensen and Lamb, 2009). The evaluated water soluble fertilizer had nitrogen in heterocyclic form so as to help plants to generate plant growth regulators like auxin, gibberellin, cytokinin, etc. and defence enzymes like phenylalanine ammonia lyase, tyrosine ammonia lyase, peroxidase, protease and chitinase while phosphorus is present in the form of phosphonic acid, a chelating agent twice effective than EDTA. So phosphorus fixation and cations are made soluble to make it available to plants. Since the information on application of water soluble fertilizer

¹Corresponding author Email: navin_jain87@yahoo.com

¹Principal Scientist; ²Scientist ICAR-Directorate of Groundnut Research, Junagadh, Gujarat 362 001

through drip irrigation in groundnut is limited, hence, the present investigation was undertaken.

MATERIALS AND METHODS

A field experiment was conducted during the summer seasons of 2011 and 2012 at the farm of Directorate of Groundnut Research, Junagadh, Gujarat, (70°36'E, 21°31'N m above mean sea level). The soil of the experimental site was Typic Haplustepts, moderately calcareous and slightly alkaline (pH 7.7) with low in organic carbon (3.3 g/kg), available nitrogen (85.3 kg/ha) and boron (0.431 ppm), medium in available phosphorus (15.3 kg/ha) and potassium (346.9 kg/ha) status. The climate of the region is semi-arid, characterized by fairly cold and dry winter, hot and dry summer, and warm and moderately humid monsoon. The rainfall commences in the second fortnight of June and ends by September with an average rainfall of 1,094 mm (average of last 10 year), practically little or no rainfall at other time of the year. Partial failure of monsoon once in 3 to 4 years is of common occurrence in this region. Mean weekly maximum temperature values ranged from 30.1 to 40.6°C during 2011 and 27.5 to 40.5°C during 2012. Whereas, corresponding values of minimum temperature ranged from 14.1 to 27.0°C and 11.2 to 26.8°C. During the crop growth season, maximum relative humidity ranged from 48 to 85% during 2011 and 37 to 81% during 2012. Whereas, the corresponding values of minimum relative humidity ranged from 11 to 45% and 8 to 40%. Open pan evaporation was highest in 17th week (10.3 mm/day) during 2011 and 13th week (10.7 mm/day) during 2012.

The experiment comprised of 6 treatments, viz. T₁, water soluble fertilizer @ 226.5 kg/ha; T₂, water soluble fertilizer @ 250.0 kg/ha; T₃, water soluble fertilizer @ 150.0 kg/ha; T₄, RDF (25 kg N, 22 kg P and 24.9 kg K/ha) fb check basin method of irrigation; T₅, T₁ + Legume special spray at 20, 40 and 60 DAS @ 2 g/litre of water and T₆, Control (No fertilizers with check basin method of irrigation), was carried out in randomized block design with 6 replications at the same site. Allwin top drip special (water soluble fertilizer or specialty fertilizer) consists of hexamine, disodium HEDP, potassium chloride and octaborate for supply of nitrogen, phosphorus, potassium and boron, respectively as per treatments and legume special (Proprietary product and contents undisclosed) are the products supplied by M/s Sree Ramcides Chemicals Pvt. Ltd., Chennai. Phosphorus, potassium and boron were applied at the time of sowing while nitrogen was applied in five splits, i.e. 50% as basal and remaining 50% at 5, 10, 30 and 60 DAS through drip irrigation as per treatments in T₁, T₂, T₃ and T₅. In check basin method of irrigation (T₄), the recommended doses of nitrogen, phosphorus and po-

tassium were applied through urea, single super phosphate and muriate of potash, respectively at the time of sowing. Boron was also applied in treatment T₄ through octaborate equal to the quantity applied in treatments T₁, T₂, T₃ and T₅. Groundnut 'TG 37 A' was sown during 2nd week of February during both the years. Plot size under each treatment was 49.5 m². In drip irrigation plots, one lateral was placed in between 2 rows of groundnut. The water discharged from each dripper was @ 4 litres/h. Weeds were controlled by pre-emergence spray of pendimethalin @ 1 kg/ha.

Observations on SPAD chlorophyll meter reading (SCMR) was taken at 50 and 75 DAS. Second fully expanded leaf from the apex (from 3 randomly selected plants from each treatment) was used to record the SCMR in the morning (8.0–9.3h) with the help of a Minolta SPAD chlorophyll meter (Minolta Crop., Ramsey, NJ, USA). The nodules/plant (75 DAS), dry matter accumulation and plant height at harvest were recorded by selecting 3 plants/treatment. Yield attributing parameters, viz. number of pegs/plant at 75 DAS, and number and weight of mature and immature pods/plant, 100-kernel weight and shelling out-turn were also recorded. At physiological stage of maturity, the crop was harvested manually and sun-dried for 4–5 days in the field and then the total biomass yield was recorded. After stripping, cleaning and drying, the pod yield was recorded at 12% moisture. Haulm yield was determined by subtracting pod yield from total biomass yield. The amount of water applied to each treatment was measured with the help of water meter. Water productivity was expressed in physical terms (g/m³) following Kijine *et al.* (2002) by dividing pod yield (dry weight basis) with the quantity of water applied. Plant samples were collected at harvest, oven dried at 65°C, processed and analysed for nitrogen, Snell and Snell (1949), phosphorus, Jackson, (1973), potassium, Jackson, (1973) and boron, Wolf, (1974) concentrations. The uptake of N, P, K and B in groundnut pod and haulm were calculated by multiplying the pod and haulm yields with their respective concentrations, expressed as kg/ha. Protein, oil and moisture contents in the kernels were determined with NIR analyser (Dickey John Corporation, USA, Model: Instalab 700). The oil yield was worked out by multiplying kernel yield with oil content while protein yield was calculated by multiplying kernel yield with protein content in kernels.

Soil samples were collected prior to start of experiment and after completion of the experiment from 0 to 15 cm depth for analysis of available N, Subbiah and Asija (1956), available P, Olsen *et al.* (1954) and available K, Jackson (1973). The soil was also analysed for pH and electrical conductivity for 0–15 cm depth (Jackson, 1973).

Treatment-wise balance sheets of NPK indicating the available nutrients in the soil at initial stage, nutrients added for raising the crop, nutrients uptake by the crop, nutrients left in the soil after the harvesting, actual gain/loss over initial status and apparent nutrients balance in the soil were worked out. The economics of different treatments was calculated by taking into account the various inputs required and outputs realized as per the prevailing cost of inputs and outputs during the respective years. All the data obtained were statistically analysed using the F-test procedure given by Gomez and Gomez (1984). The critical difference (CD) values at P=0.05 were used for determining the significance of differences between treatment means. The trend of the results was similar during both the 2 years, hence data were subjected to pooled analysis for results and comparison.

RESULTS AND DISCUSSION

Growth parameters

At 50 days after sowing (DAS), significantly higher SPAD chlorophyll meter reading (SCMR) was recorded with the application of water soluble fertilizer through drip irrigation @ 150 kg/ha and was at par with the control and recommended dose of fertilizers (Table 1). However, there was no significant difference in treatment means at 75 DAS. Significantly higher number of nodules/plant (43.1) were recorded with the application of water soluble fertilizer @ 226.5 kg/ha through drip irrigation over other treatments at 75 DAS. Maximum dry matter accumulation/plant was also recorded with application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha which was significantly superior over rest of treatments except application of recommended dose of fertilizers fb check basin irrigation at harvest (Table 1). The improvement with the application of water soluble fertilizer @ 226.5 kg/ha was to the tune of 23.5, 15.7, 4.0, 28.7 and 53.3% over T₂, T₃, T₄, T₅ and T₆, respectively. Application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha significantly increased the plant height of groundnut over other treatments and produced 19.0, 15.5, 24.7, 20.2 and 39.3% taller plants compared with T₂, T₃, T₄, T₅ and T₆, respectively (Table 1). It is well established fact that adequate fertilization improved various physiological and metabolic processes in the plant system. Profound influence of water soluble fertilizer on crop growth seems to be due to maintaining congenial nutritional environment of plant rhizosphere on account of their increased availability which increased the nitrogenase activity of roots that resulted in higher physiological growth parameters. Hebbar *et al.* (2004) also reported significantly higher total dry matter in tomato with water soluble fertilizer through fertigation at Hebbal, Bangalore. Generally, young plants

Table 1. Effect of water soluble fertilizer on growth and yield attributes of groundnut (Mean data of 2 years)

Treatment	SCMR		Dry-matter accumulation (g/plant)	Plant height (cm)	Nodules/plant (75 DAS)	Pegs/plant (75 DAS)	Mature pods/plant	Immature pods/plant	Weight of mature pods/plant (g)	Weight of immature pods/plant (g)	100-kernel weight (g)	Shelling out-turn (%)
	50 DAS	75 DAS										
T ₁ , WSF @ 226.5 kg/ha	31.7	35.3	18.4	35.1	43.1	18.0	10.6	1.48	10.3	0.81	43.7	68.6
T ₂ , WSF @ 250.0 kg/ha	32.5	35.1	14.9	29.5	32.9	15.4	8.0	2.13	8.0	1.28	42.3	65.9
T ₃ , WSF @ 150.0 kg/ha	34.9	37.4	15.9	30.4	32.7	15.2	8.4	2.37	8.3	1.87	42.5	65.6
T ₄ , RDF fb check basin method	32.9	36.2	17.7	27.9	32.8	18.8	9.6	1.78	9.3	1.36	40.6	66.5
T ₅ , T ₁ + Legume special spray	32.8	36.8	14.3	29.2	34.3	14.5	7.4	1.57	7.6	0.45	41.5	66.6
T ₆ , Control	33.3	37.6	12.0	25.2	25.0	14.8	6.0	2.44	6.3	0.56	39.8	65.3
SEm±	0.7	0.8	0.6	0.9	2.9	1.2	0.5	0.16	0.4	0.08	1.0	0.9
CD (P=0.05)	2.1	NS	1.8	2.8	8.6	NS	1.4	0.47	1.0	0.22	2.8	2.5

WSF, Water soluble fertilizer; SCMR, SPAD chlorophyll meter reading

need lower amounts of nutrients because their absolute growth rates are low.

Yield attributes

At 75 DAS, there was no significant difference in number of pegs/plant due to various treatments (Table 1). Whereas, application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha significantly increased number and weight of mature pods/plant over other treatments except application of recommended dose of fertilizers fb check basin irrigation (Table 1). On the other hand, significantly maximum number of immature pods/plant (2.44) were recorded under the control but remained at par with application of water soluble fertilizer @ 150 and 250 kg/ha while maximum weight of immature pods/plant was found with the application of water soluble fertilizer @ 150 kg/ha (1.87 g/plant). Application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha significantly increased 100-kernel weight over T_4 and T_6 and shelling out-turn over T_2 , T_3 and T_6 . Efficient and greater partitioning of metabolites and adequate translocation and accumulation of photosynthates, amino acids, vitamins, etc. to developing reproductive structures under adequate and increased nutrient use efficiency seems to have resulted in increase in all the yield attributing characters. The fertigation provided better conducive conditions for better uptake of nutrients and in turn helped the plants to boost their growth leading to the development of yield attributes through supply of more photosynthates towards the reproductive sink compared to conventional method of soil application of nutrients (Jayakumar *et al.*, 2014).

Yield and harvest index

All the treatments had significant effect on pod, haulm and kernel yields of groundnut over control. Significantly higher pod (2.67 t/ha), kernel (1.82 t/ha) and haulm yields (4.96 t/ha) were obtained with the application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha over rest of the treatments and were 9.9 and 35.5%, 13.4 and 41.1% and 7.6 and 27.2% higher over recommended dose of fertilizers and control, respectively on pooled basis (Fig. 1 and Table 2). None of the treatments had any perceptible variation on harvest index of groundnut over control (Table 2). In fact, crop yield is a complex entity which depends on complementary interaction between vegetative and reproductive growth of the crop. Marked increase in economic yield appeared to be on account of beneficial effect of application of water soluble fertilizer through drip irrigation on growth and yield attributes of the crop (Table 1). Further, the better performance under drip was attributed to maintenance of favourable soil water status in the root zone, which in turn helped the plants

Table 2. Effect of water soluble fertilizer on kernel yield, quality, economics, water saving, nutrient uptake and physical properties of soil (Mean data of 2 years)

Treatment	Kernel yield (t/ha)	Harvest index (%)	Protein content (%)	Protein yield (t/ha)	Moisture (%)	Oil content (%)	Oil yield (t/ha)	Net returns ($\times 10^3$ ₹/ha)	Benefit: cost ratio	Water saving (%)	Water productivity (g/m ³)	B uptake (g/ha)	Total NPKB uptake (kg/ha)	pH	EC (dS/m)
T_1 , WSF @ 226.5 kg/ha	1.82	35.1	27.5	0.50	7.18	50.3	0.92	50.9	2.24	38.0	787	294.2	200.1	7.63	0.84
T_2 , WSF @ 250.0 kg/ha	1.41	33.6	27.2	0.38	7.10	49.9	0.70	32.5	1.77	36.0	613	220.7	159.3	7.63	0.92
T_3 , WSF @ 150.0 kg/ha	1.53	34.7	27.2	0.41	7.09	49.6	0.76	43.8	2.19	36.3	670	219.2	170.9	7.60	0.91
T_4 , RDF fb check basin method	1.61	34.6	27.3	0.44	7.11	49.4	0.80	49.1	2.42	-	441	226.9	171.7	7.63	0.79
T_5 , T_1 + Legume special spray	1.44	34.2	28.3	0.41	7.13	49.7	0.72	33.8	1.82	38.0	641	208.8	157.1	7.60	0.86
T_6 , Control	1.29	33.5	28.2	0.36	7.09	49.1	0.63	37.3	2.19		359	169.3	146.0	7.67	0.83
SEm \pm	0.04	0.6		0.01	0.8	0.2	0.02					11.2		0.03	0.12
CD (P=0.05)	0.11	NS	NS	0.04	NS	0.6	0.05					31.8		NS	NS

WSF, Water soluble fertilizer

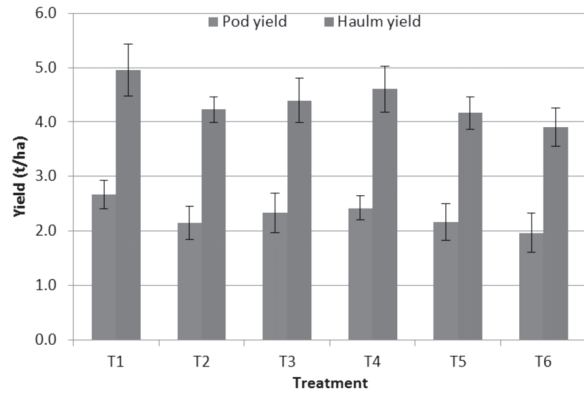


Fig. 1. Effect of various treatments on pod and haulm yields of groundnut (Mean data of 2 years) (bar represents \pm SD)

to utilize moisture as well as nutrients more efficiently from the limited wetted area (Hebbar *et al.*, 2004).

Quality

A significantly higher oil content in groundnut kernels was registered with application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha and it was at par with T₂ and T₅ treatments (Table 2). Oil yield is a function of oil content and kernel yield. Oil yield was also affected significantly due to various treatments as kernel yield. Application of water soluble fertilizer @ 226.5 kg/ha (0.92 t/ha) significantly improved oil yield by 31.4, 21.1, 15.0, 27.8 and 46.0% over T₂, T₃, T₄, T₅ and T₆, respectively. On the contrary, protein and moisture contents in groundnut kernels did not differ significantly due to various treatments but significantly higher protein yield (0.50 t/ha) was recorded with the application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha over rest of the treatments.

Water saving and water productivity

Application of water soluble fertilizer through drip irrigation at different doses (150, 226.5 and 250 kg/ha) as well as legume special spray along with water soluble fertilizer @ 226.5 kg/ha saved water to the extent of 36–38% over check basin method of irrigation (Table 2). It showed that this precious water could be utilized to raise other low water requiring crops efficiently and successfully. The water productivity was lower in check basin method of irrigation compared to drip irrigation (Table 2). The highest water productivity was recorded in treatment receiving water soluble fertilizer @ 226.5 kg/ha (787 g/m³) while the lowest value was obtained in the control (359 g/m³).

Economics

Maximum net returns (50.9 \times 10³ ₹/ha) accrued with the application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha over other treatments (Table 2). On the other hand, maximum benefit cost ratio (2.42:1) was obtained under recommended dose of fertilizer fb check basin method of irrigation.

Nutrient uptake

A significantly higher uptake of N (145.2 kg/ha), P (20.3 kg/ha), K (34.4 kg/ha) and B (294.2 g/ha) by groundnut was recorded with the application of water soluble fertilizer through drip irrigation @ 226.5 kg/ha over other treatments except total K uptake which was at par with water soluble fertilizer @ 150 kg/ha and recommended dose of fertilizers (Table 2, 3, 4 and 5). Further, the total NPKB uptake was also maximum (200.1 kg/ha) under this treatment.

Soil nutrient balance and physical properties

The expected N balance in soil was highly negative in the plots receiving water soluble fertilizer through drip

Table 3. Effect of water soluble fertilizer on nitrogen balance (kg/ha) in soil after harvest of groundnut (Mean data of 2 years)

Treatment	Initial soil N status (A)	N added (B)	N uptake (C)	Expected balance in soil {(A+B)-C} (D)	Soil N status after harvest (E)	Apparent balance, gain(E-D) or loss (D-E) (F)	Actual gain (E-A)/loss (A-E) (G)
T ₁ , WSF @ 226.5 kg/ha	85.3	25.0	145.2	-34.9	101.2	136.1	15.9
T ₂ , WSF @ 250.0 kg/ha	85.3	32.0	114.2	3.1	121.3	118.2	36.0
T ₃ , WSF @ 150.0 kg/ha	85.3	16.0	120.3	-19.0	95.3	114.4	10.0
T ₄ , RDF fb check basin method of irrigation	85.3	25.0	121.6	-11.3	106.6	117.9	21.3
T ₅ , T ₁ + Legume special spray	85.3	25.0	112.8	-2.5	112.9	115.4	27.6
T ₆ , Control	85.3	0.0	104.7	-19.4	91.1	110.5	5.8
SEm \pm			3.1		6.7		
CD (P=0.05)			8.7		15.7		

WSF, Water soluble fertilizer

Table 4. Effect of water soluble fertilizer on phosphorus balance (kg/ha) in soil after harvest of groundnut (Mean data of 2 years)

Treatment	Initial soil P status (A)	P added (B)	P uptake (C)	Expected balance in soil{(A+B)-C} (D)	Soil P status after harvest (E)	Apparent balance, gain(E-D) or loss (D-E) (F)	Actual gain (E-A)/loss (A-E) (G)
T ₁ , WSF @ 226.5 kg/ha	15.3	50.0	20.3	45.0	17.8	-27.3	2.5
T ₂ , WSF @ 250.0 kg/ha	15.3	48.3	16.6	47.0	23.8	-23.1	8.5
T ₃ , WSF @ 150.0 kg/ha	15.3	33.8	17.3	31.8	16.0	-15.7	0.7
T ₄ , RDF fb check basin method of irrigation	15.3	50.0	17.8	47.5	19.3	-28.2	4.0
T ₅ , T ₁ + Legume special spray	15.3	50.0	16.9	48.4	21.5	-26.9	6.2
T ₆ , Control	15.3	0.0	15.8	-0.5	13.2	13.7	-2.1
SEm±			0.7		1.0		
CD (P=0.05)			1.9		2.4		

WSF, Water soluble fertilizer

Table 5. Effect of water soluble fertilizer on potassium balance (kg/ha) in soil after harvest of groundnut (Mean data of 2 years)

Treatment	Initial soil K status (A)	K added (B)	K uptake (C)	Expected balance in soil {(A+B)-C} (D)	Soil K status after harvest (E)	Apparent balance, gain(E-D) or loss (D-E) (F)	Actual gain (E-A)/loss (A-E) (G)
T ₁ , WSF @ 226.5 kg/ha	346.9	30	34.4	342.5	361.6	19.1	14.7
T ₂ , WSF @ 250.0 kg/ha	346.9	36	28.3	354.6	378.3	23.7	31.4
T ₃ , WSF @ 150.0 kg/ha	346.9	18	33.1	331.8	353.1	21.3	6.2
T ₄ , RDF fb check basin method of irrigation	346.9	30	32.0	344.9	365.3	20.5	18.4
T ₅ , T ₁ + Legume Special spray	346.9	30	27.2	349.7	372.3	22.5	25.4
T ₆ , Control	346.9	0	25.3	321.6	323.6	2.0	-23.3
SEm±			0.9		10.5		
CD (P=0.05)			2.5		24.7		

WSF, Water soluble fertilizer

irrigation @ 226.5 kg/ha probably due to more crop yield and higher N uptake, indicating N mining (Table 3). However, the actual N balance was positive in all the treatments added with N and in control plot also where no N was applied and maximum actual gain (36.0 kg/ha) was in the plots receiving water soluble fertilizer through drip irrigation @ 250 kg/ha. This was probably due to less uptake and more addition of N fertilizers in the treatment. Maximum apparent N balance was observed in the treatment receiving water soluble fertilizer through drip irrigation @ 226.5 kg/ha. The expected P balance was found maximum in the treatment receiving water soluble fertilizer through drip irrigation @ 226.5 kg/ha + Legume Special spray (48.4 kg P/ha) while it was negative in the control plot (-0.5 kg/ha) (Table 4). Maximum actual P gain (8.5 kg/ha) was recorded in the treatment receiving water soluble fertilizer through drip irrigation @ 250 kg/ha due to more addition of phosphatic fertilizers in comparison to uptake. The apparent P balance (13.7 kg/ha) was found positive only in the control plots. The expected K balance

in soil was found positive in all the plots and maximum value was recorded in the treatment receiving water soluble fertilizer through drip irrigation @ 250 kg/ha due to more addition of potassic fertilizers and less yield (Table 5). Actual K loss was recorded in the control plots due to no addition of K fertilizers while K gain was found maximum in the treatment receiving water soluble fertilizer through drip irrigation @ 250 kg/ha due to more addition of potassic fertilizers and less yield. Maximum apparent K gain (23.7 kg/ha) was also observed in the treatment receiving water soluble fertilizer through drip irrigation @ 250 kg/ha while it was minimum in the control plots (2.0 kg/ha). There was no appreciable variation in soil pH and EC after completion of 2 cropping cycles due to various treatments at 5% of probability level (Table 2). The pH and EC remained virtually constant at 7.60–7.67 and 0.79–0.92 dS/m, respectively in the all treatments.

On the basis of two years experimentation, it could be concluded that application of water soluble fertilizer @ 226.5 kg/ha through drip irrigation in groundnut could be

recommended for realizing higher productivity, net returns and water productivity.

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