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# Performance of groundnut (*Arachis hypogaea* L.) during *Rabi* under cumulative influence of land configuration and fertigation

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**Abstract**
Irrigation water is one of the most important input which is scarce and expensive. Water conservation can be carried out either through tillage or land surface management. Land configuration is the best method to reduce the yield loss, and helps in infiltration of rainfall, prevents runoff and improves water use efficiency. Appropriate irrigation system will supply uniform distribution of water which is essential to increase crop yield. Micro irrigation system offers a great degree of control over water and fertilizer application to meet the requirement of crops. A field experiment was conducted during *rabi* season of 2021-22 to appraise the performance of groundnut under the cumulative influence of land configurations, irrigation schedules and fertigation levels at Agricultural Research Station, Garikapadu. The experiment was conducted in a split-split plot design with three replications. The experiment comprised of sixteen treatment combinations with two Land configurations *viz*., raised bed and furrow ($M_1$), flat bed ($M_2$) as main plots, two Irrigation schedules *viz*., irrigation on every 3rd day ($I_1$), irrigation on every 5th day ($I_2$) as sub plots and four fertigation levels *viz*., 100% RDF through drip ($F_1$), 75% RDF through drip ($F_2$), 50% RDF through drip ($F_3$) and 100% RDF as soil application ($F_4$) in sub-sub plots. The results revealed that raised bed and furrow recorded significantly higher plant height, Dry matter accumulation, yield attributes and yield of *rabi* groundnut over flat bed. Irrigation on every 3rd day recorded significantly higher yield attributes and yield over irrigation on every 5th day. Among the different fertigation levels, application of 100% RDF through drip recorded the highest pod, kernel and haulm yield, whereas 75% RDF through drip was found on a par with the 100% RDF as soil application.

**Keywords:** Land configurations, irrigation schedules, fertigation levels and yield attributes

## Introduction
Groundnut is the king of oilseeds belongs to the family Leguminoceae and is also is also called as peanut, earthnut, monkeynut, goobernut, manilanut is a native of South America (Hammons *et al*., 1982) [2]. The *rabi* crop utilizes the residual moisture and scanty rainfall during winter and produces good yield as compared to the *kharif* crop and a few irrigations help in improving the yield. Land configuration can be considered as one of the most important management practices which increases input use efficiency and crop production but it primarily depends on soil type and rainfall that received during the crop period (Sathiya *et al*., 2020) [13]. Groundnut can be grown under different land configuration methods like broad bed and furrow, ridges and furrow, flat bed method and raised bed and furrow (RBF) are some of the management practices to increase the growth and yield of groundnut over conventional method of cultivation (Li *et al*., 2010) [8]. One way is changing the irrigation methods from surface methods which are traditional and led efficient to pressurized methods like using drip and sprinkler methods which were proved efficient in saving water (Rathod and Trivedi, 2011) [12]. Drip irrigation method allows for more uniform distribution as well as more precise control on the amount of water to be applied (Phene *et al*., 1994) [11], leading to saving of water (Khan *et al*., 1997) [7]. With frequent application of water at upper layers of the soil keep moistened more time compared to less frequent irrigation by irrigating through drip Micro irrigation system offers a great degree of control over water and fertilizer application to meet the requirement of crops. Fertigation, fertilizers applied through emitters directly in the active root zone and fertilizer use can be improved over conventional method of fertilizer application. Fertilizer requirement can be reduced by 15-25% with fertigation through drip without affecting the yield (Jain *et al*., 2018) [3]. To study the accumulative effect of land configurations, irrigation schedules and fertigation levels on performance of groundnut, the present investigation was carried out in Krishna zone, Andhra Pradesh.

## Material and Methods

Field experiment was conducted at Agricultural Research Station, Garikapadu during the *rabi* season of 2021-22. The experimental site was sandy clay loam soil with pH of 7.3, low in available nitrogen (176.5 kg $ha^{-1}$), potassium (100.15 kg $ha^{-1}$) and organic carbon content (0.11%) and medium in available phosphorous (28.20 kg $ha^{-1}$). Groundnut variety, Kadiri 6 was taken as the test variety. Sowing was done with the spacing of 22.5 cm × 10 cm. Raised bed and furrows are prepared with 90 cm width and 30 cm furrow. The drip irrigated plots were laid with one lateral for each two rows with the dripper discharge of 2 L $hr^{-1}$. Crop is irrigated on every third and fifth day based on the pan evaporation. Pre-sowing irrigation was common to all the treatments to ensure uniform germination. The irrigations were delayed until the crop reach thirty-five days due to the continuous rainfall. Phosphorous was applied as basal to all the treatments based on the recommended dose in the form of single super phosphate. First split of urea and entire dose of potassium in the form of muriate of potash was applied at 35 DAS and second split of urea applied at 45 DAS. All the data recorded was subjected to statistical analysis as suggested by Gomez and Gomez (1984) [1].

## Results and Discussion

### Plant Height (cm)

Plant height of *rabi* groundnut (Table 1) was significantly influenced by different land configurations and irrigation levels. Higher plant height was found under raised bed and furrow over flat bed method at harvest, this might be due to RBF maintained proper soil environment which ultimately resulted in better growth of the crop. Similar results were reported by Joshi *et al*. (2018) [5]. Increased plant height was recorded in scheduling irrigation on every 3rd day this might be due to frequent irrigation under drip might have led to effective absorption and utilization of moisture and nutrients resulting in quick canopy growth and resulted in increased plant height. Similar results were documented by Padmalatha *et al*. (2016) [10]. Plant height was significantly highest under $F_1$, whereas $F_2$ was on a par with $F_4$ treatment. The lowest plant height was recorded under $F_3$. The water-soluble fertilizers through drip made the adequate use of nutrients which improved various physiological and metabolic processes in the plant system which led to increase in growth of the plants. Similar results were reported by Jain *et al*. (2018) [3].

### Dry matter Accumulation (kg $ha^{-1}$)

The data recorded on Dry matter accumulation of groundnut (Table 1) revealed that the maximum Dry matter was recorded in raised bed and furrow which was significantly superior over flat bed method, whereas, irrigation scheduling on every 3rd day ($I_1$) recorded significantly higher Dry matter (5363 kg $ha^{-1}$) over irrigation schedule on every 5th day ($I_2$). Less irrigation intervals might have supplied the optimum moisture which could have enhanced the assimilatory efficiency resulted in increased no. of leaves per plant, better branching and increased the leaf area which contributed for Dry matter accumulation. The highest Dry matter accumulation was recorded in 100% RDF through drip which was significantly superior over other treatments, whereas $F_2$ was at par with $F_4$. The lowest Dry matter accumulation was recorded with $F_3$. This was mainly because of application of fertilizer through drip fertigation resulted in continuous supply of nutrients besides maintaining optimum water availability, which lead to higher uptake of nutrients, which in turn recorded higher growth attributes. Similar results were documented by Jain *et al*. (2018) [3].

### Number of Pods per Plant

Number of pods per plant (Table 1) were significantly influenced by land configurations. The significantly highest number of pods per plant were recorded in raised bed and furrow than the flat bed method. This might be due to the better performance of groundnut crop observed in terms of plant height and dry matter accumulation per plant obtained under RBF which ultimately reflected in higher number of pods per plant. Similar results were reported by Kamble *et al*. (2016) [6]. Irrigation schedules also significantly influenced the number of pods per plant. Irrigation on every 3rd day significantly recorded the highest number of pods per plant (16) than scheduling of irrigation on every 5th day (14). Frequent irrigation under drip treatment might have created favourable moisture conditions for crop growth consequently increased the values of yield attributes (Soni *et al*., 2017) [15]. Among the fertigation levels $F_1$ recorded the significantly highest number of pods per plant over the fertigation treatments. Application of 75% RDF through drip and 100% RDF as soil application were statistically at par with each other. $F_3$ treatment significantly recorded the lowest number of pods per plant over the fertigating treatments. The optimum availability of moisture and nutrients in the root zone throughout the crop growth which would have favoured better pegging and pod development and effective uptake of required quantity of N, P and K resulting in higher translocation of photosynthates from source to sink (Sukeshni *et al*., 2009 and Suresh *et al*. 2013) [16, 17].

### 100 Kernel Weight (g)

Test weight was not statistically influenced by land configurations and different irrigation schedules, however, it was significantly influenced by fertigation levels (Table 1). Drip fertigation with $F_1$ recorded the highest 100 kernel-weight over other fertigation treatments, $F_2$ was at par with $F_4$. $F_3$ treatment significantly recorded the lowest 100 kernel weight over all the fertigation treatments. The optimum availability of nutrients and moisture in the root zone throughout the crop growth which would have favoured the increase in yield attributes.

### Pod Yield (kg $ha^{-1}$)

Raised bed and furrow recorded (Table 2) the significantly highest pod yield (2472 kg $ha^{-1}$) over the flat bed method (2054 kg $ha^{-1}$). This might be due to RBF provided loose soil mass, adequate soil moisture and air tends to increased yield components and yield. Similar results were reported by Sathiya *et al*. (2020) [13]. Scheduling of irrigation on every 3rd day recorded the significantly higher pod yield over scheduling of irrigation on every 5th day, this might be due to increase in frequency of irrigation that have favoured congenial conditions for the luxurious growth of crop and consequently increased the pod yield. These results are in accordance to the findings of Suresh *et al*. (2013) [17], Naresha *et al*. (2018) [9]. $F_1$ recorded the significantly highest pod yield over all the fertigation treatments. $F_2$ and $F_4$ recorded similar pod yields. The $F_3$ treatment significantly recorded the lowest

pod yield compared to all the fertigation treatments. This might be due to increased nutrient availability and absorption by the crop with frequent nutrient supply by fertigation and consequent better formation and translocation of assimilates from source to sink might have increased the pod yield under fertigation. Similar findings were reported by Singandhupe *et al*. (2003) [14].

**Kernel Yield (kg ha$^{-1}$)**

A significant difference in kernel yield (Table 2) was found with different land configurations. Raised bed and furrow recorded the highest kernel yield over the flat bed method. Scheduling of irrigation on every 3$^{rd}$ day recorded the highest kernel yield (1517 kg ha$^{-1}$) over scheduling of irrigation on every 5$^{th}$ day, this might be due to increase in the frequency of irrigation which was ascribed to adequate moisture availability in turn increased the higher values of the yield attributes and kernel yield. These results are in accordance to the findings of Jain *et al*. (2018) [4]. Fertigation with $F_1$ recorded the highest kernel yield over the fertigation treatments. $F_2$ was at par with $F_4$. The lowest kernel yield was recorded with $F_3$. Increase in kernel yield with fertigation rates might be due to higher number of pods and heavier kernel weight which resulted from improved nutrient use efficiency. Similar results were documented by Jain *et al*. (2018) [4].

**Table 1:** Growth and yield attributes of groundnut as influenced by different land configurations, irrigation schedules and fertigation levels

| Treatments | Plant height (cm) | Dry matter accumulation (kg ha$^{-1}$) | Number of pods per plant | 100 kernel weight (g) |
|---|---|---|---|---|
| **Main plot: Land configurations** | | | | |
| $M_1$: Raised bed and furrow | 36.93 | 5642 | 18 | 37.51 |
| $M_2$: Flat bed | 34.65 | 4665 | 12 | 35.12 |
| S.Em± | 0.35 | 69.08 | 0.36 | 0.81 |
| C.D (p=0.05) | 2.12 | 420.32 | 1.18 | NS |
| C.V (%) | 4.8 | 6.6 | 11.8 | 5.2 |
| **Sub plot: Irrigation schedules** | | | | |
| $I_1$: Irrigation on every 3$^{rd}$ day | 36.32 | 5363 | 16 | 36.92 |
| $I_2$: Irrigation on every 5$^{th}$ day | 35.26 | 4944 | 14 | 35.71 |
| S.Em± | 0.23 | 53.87 | 0.34 | 0.61 |
| C.D (p=0.05) | 0.9 | 211.5 | 1.1 | NS |
| C.V (%) | 3.1 | 5.1 | 11.0 | 6.6 |
| **Sub-sub plot: Fertigation levels** | | | | |
| $F_1$: 100% RDF through drip | 38.28 | 5624 | 18 | 38.80 |
| $F_2$: 75% RDF through drip | 36.33 | 5247 | 15 | 36.90 |
| $F_3$: 50% RDF through drip | 33.16 | 4675 | 12 | 33.80 |
| $F_4$: 100% NPK in soil | 35.38 | 5069 | 14 | 35.76 |
| S.Em± | 0.43 | 106.85 | 0.33 | 0.66 |
| C.D (p=0.05) | 1.3 | 311.9 | 1.0 | 1.94 |
| C.V (%) | 4.2 | 7.2 | 7.7 | 5.8 |
| **Interaction** | | | | |
| M × S | NS | NS | NS | NS |
| M × SS | NS | NS | NS | NS |
| S × SS | NS | NS | NS | NS |

**Table 2:** Pod and Kernel yield of groundnut as influenced by different land configurations, irrigation schedules and fertigation levels

| Treatments | Pod yield (kg ha$^{-1}$) | Kernel yield (kg ha$^{-1}$) |
|---|---|---|
| **Main plot: land configuration** | | |
| $M_1$: Raised bed and furrow | 2472 | 1623 |
| $M_2$: Flat bed | 2054 | 1235 |
| S.Em± | 35.12 | 17.59 |
| C.D (p=0.05) | 213.7 | 107.1 |
| C.V (%) | 7.60 | 6.03 |
| **Sub plot: Irrigation schedules** | | |
| $I_1$: Irrigation on every 3$^{rd}$ day | 2379 | 1517 |
| $I_2$: Irrigation on every 5$^{th}$ day | 2147 | 1340 |
| S.Em± | 32.90 | 23.45 |
| C.D (p=0.05) | 129.2 | 92.1 |
| C.V (%) | 7.1 | 8.0 |
| **Sub-sub plot: Fertigation levels** | | |
| $F_1$: 100% RDF through drip | 2525 | 1690 |
| $F_2$: 75% RDF through drip | 2293 | 1467 |
| $F_3$: 50% RDF through drip | 2000 | 1161 |
| $F_4$: 100% NPK in soil | 2232 | 1398 |
| S.Em± | 78.74 | 33.73 |
| C.D (p=0.05) | 229.8 | 130.2 |
| C.V (%) | 12.1 | 8.2 |
| **Interaction** | | |
| M × S | NS | NS |
| M × SS | NS | NS |
| S × SS | NS | NS |

## Conclusion

It can be concluded that for *rabi* groundnut raised bed and furrow recorded significantly higher growth, yield attributes and yield of groundnut. Irrigation on every 3rd day recorded the significantly higher growth, yield and attributes and yield over irrigation scheduled on every 5th day. The highest yield attributes and yield was recorded under $F_1$, whereas $F_2$ and $F_4$ were found to be at par. The treatment $F_3$ recorded the significantly lowest yield attributes and yield.

## References


1. Gomez KA, Gomez A. Statistical procedures for agricultural research. Ist ed. John Wiley Sons, New York; c1984.
2. Hammons RO, Herman D, Stalker HT. Origin and early history of the peanut. In Peanuts; c2016. p. 1-26.
3. Jain NK, Jat RA, Yadav RS, Bhaduri D, Meena HN. Polythene mulching and fertigation in peanut (*Arachis hypogaea*): Effect on crop productivity, quality, water productivity and economic profitability. Indian Journal of Agricultural Sciences. 2018;88(8):1168-78.
4. Jain NK, Meena HN, Badhuri D, Yadav RS. Drip irrigation and irrigation interval effects on growth, productivity, nutrient, and water economy in summer peanut. Communications in Soil Science and Plant Analysis; c2018.
5. Joshi JR, Patel VM, Barad HL, Macwan SM, Ehsas J. Effect of land configuration and fertilizer management practices on growth, yield and yield attributes and economics of summer cowpea (*Vigna unguiculata* L.) under south Gujarat condition. International Journal of Current Microbiology and Applied Sciences. 2018;7(1):1-148.
6. Kamble AS, Waghmode BD, Sagvekar VV, Navhale VV, Mahadkar UV. Effect of land configuration and mulching on productivity and energy use in groundnut. Indian Journal of Agronomy. 2016;61(4):489-494.
7. Khan AH, Stone LR, Lamm FR. Water flux below the root zone vs. drip-line spacing in drip-irrigated corn. Soil Science Society of America Journal. 1997;61(6):1755-1760.
8. Li QQ, Zhou XB, Chen YH, Yu SL. Grain yield and quality of winter wheat in different planting patterns under deficit irrigation regimes. Plant, Soil and Environment. 2010;56(10):482-487.
9. Naresha R, Laxminarayana P, Suneetha Devi KB, Sailaja V. Quality, yield and economics of rabi groundnut as influenced by irrigation scheduling and phosphogypsum levels. International Journal of Current Microbiology and Applied Sciences. 2018;7(3):3292-3303.
10. Padmalatha Y, Bhargavi K, Narayanaswamy G. Influence of irrigation depth and interval under drip irrigation method on productivity of *rab*i groundnut (*Arachis hypogaea* L.) in water scarce regions. Journal of Oilseeds Research. 2016;33(2):121-125.
11. Phene CJ, Yue R, Davis KR, Wu IP, Mead RM, Hutmacher RB. Evaluation of a subsurface drip irrigation system after ten cropping seasons. In American Society of Agricultural Engineers. Meeting; c1993.
12. Rathod AB, Trivedi SA. Summer groundnut crop performance and economics under drip irrigation at various water application levels. In National Conference on Recent Trends in Engineering and Technology; c2011.
13. Sathiya K, Hussainy SAH, Sridhar P. Effect of land configuration and mulching on the growth, yield and economics of groundnut (*Arachis hypogaea*). Research on Crops. 2020;21(2):226-230.
14. Singandhupe RB, Rao GGSN, Patil NG, Brahmanand PS. Fertigation studies and irrigation scheduling in drip irrigation system in tomato crop (*Lycopersicon esculentum* L.). European journal of agronomy. 2003;19(2):327-340.
15. Soni JK, Raja AN, Ajaykumar R. Response of physiological and yield attributing parameters of groundnut under drip and micro sprinkler fertigation. An International Quarterly Journal of Life Sciences. 2017;12(1):373-376.
16. Sukeshni W, Harshana B, Bhuyar RC. Effect of different micro-irrigation methods on growth, yield and quality of summer groundnut in Vidharbha. Green farming. 2009;2(6):351-353.
17. Suresh K, Balaguravaiah D, Ramulu V, Sujani Rao CH. Comparative efficiency of sprinkler irrigation over check basin irrigation in groundnut at different irrigation schedules. International Journal of Plant Animal and Environmental Sciences. 2013;3(2):9-13.