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# Constrains faced by farmers in different (Drip, Sprinkler and Flood) irrigation methods and suggestions given by them in Arecanut cultivation at Chitradurga district of Karnataka

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**Abstract**
A study conducted to find the Constrains faced by farmers in different irrigation methods (drip, sprinkler and flood) and suggestions given by them in Arecanut cultivation at Chitradurga district of Karnataka in 2018-2019. By simple random sampling of 40 respondents each from 3 different irrigation methods followed farmers of 3 taluks (Chitradurga, Hiriyuru, and Holalkere) of Chitradurga district. The results showed that. Major constraints faced by farmers 'high installation cost' in drip irrigation. 'Nozzle blocking' in sprinkler irrigation. 'High labour cost' in flood irrigation. The suggestions included 'MSP facility should be provided for Arecanut' in drip irrigation farmers. 'Regular supply of electricity' in sprinkler irrigation farmers. 'Need of training for effective management of soil crusting' in case of flood irrigation.

**Keywords:** Installation cost, nozzle blocking, need of training, soil crusting

## Introduction
India is the largest exploiter of groundwater in the world next to the United States and Europe. India pumps twice the groundwater pumped in the United States and six times that pumped in the Europe Union. Since the groundwater resources are extracted indiscriminately, there have been massive initial and premature well failures in Peninsular India, and Karnataka is no exception leading to a sharp decline in the number of open wells and increase in many bore well failures. Only in exceptional circumstances in Krishna command area in Karnataka, dug/open well is still functioning. In the regions under Eastern and Central Dry Zones of Karnataka, the depth of the bore wells has gone up to the level of 1,500 feet and 2,000 feet in some areas. In many regions, micro-irrigation methods (drip and sprinkler) are slowly catching up as a coping strategy for the economic scarcity of groundwater.
The occurrence and distribution of rainfall in the Karnataka state are highly unpredictable. The average annual rainfall is 1,138 mm received over 55.00 rainy days. It varies from a slow as 569.00 mm in the east to as high as 4,029 mm in the west. About 2/3rd of the geographical area of the state receives less than 750.00 mm of rainfall (Chandrakanth, 2009) [1].
Chitradurga district is a basic hard rock area that has a total geographical area of 8388 sq.kms. It receives low to moderate rainfall and is one of the drought-prone districts in the state. Normal annual rainfall in the district based on 30 years data is 574 mm. However, in the last decade, the district received an average annual rainfall of 631.10 mm varies between 668 mm in Holalkere in the western part and 457 in Challakere in the north eastern part.
The farmers of the Chitradurga district were growing Arecanut in 23,697 ha. Among six taluks, Holalkere (13305 ha), Chitradurga (4559 ha), Hiriyuru (2993 ha) and Challakere (610 ha) are the leading in area and production of Arecanut. Arecanut is most growing plantation crop and majority of the famers depends on it as their livelihood. In such conditions the farmers were facing more problems in different irrigation methods.
Hence, this investigation was conceived with the primary objective of studying the constraints faced by the Arecanut growing farmers in different irrigation methods and suggestions given by them to improve their farming conditions.

## Review of literature
Uday *et al.* (2007) [4] conducted a investigation on the drip irrigation system installed for grape orchards in the Nasik district of Maharashtra. Results of the study revealed that the number

of respondents faced many problems like clogging of emitters (85.00 %), irregular water supply (87.50 %), and irregular electricity supply (91.66%) and high initial cost (75.00%). The other problems faced were material transport facilities (36.66 %), lack of technical knowledge (39.17 %) and high cost of spare parts (33.33%).

Shashidhara *et al.* (2007) [3] reported that a high percentage *i.e.* (95.55%) of farmers had expressed the problem of non-availability of quality material and no follow up service by agencies is (81.11%). The other constraints like high initial investment cost, lack of capital to cover maximum holding under drip irrigation and delay in sanction of the loan were experienced by 62.22, 56.66 and 53.33 per cent of farmers, respectively.

Barse *et al.* (2010) [2] in his study suggested that supply of electricity regularly, increase subsidy and more facility on drip irrigation by government and training should be given to farmers regarding operation, maintenance, repairing and application of water soluble fertilizers.

## Methodology

### Description of the study area

The study was conducted in Chitradurga district of Karnataka state. Chitradurga district lies in the central dry zone of Karnataka at 14°00' Northern latitude and 76°50' of Eastern longitude at a mean altitude of 732 meters above sea level. The average annual temperature is around 37°C.The average annual rainfall is 744 mm. The district is bounded by Tumkur district to the south east and, Chikkamagaluru district to southwest, Davanagere district to the west, Bellary district to north and Anantapur district of Andhra Pradesh to east. The predominant soil types are black and red soils. The farmers of the Chitradurga district were growing Arecanut in 23,697 ha. Out of six taluks, Holalkere (13305 ha), Chitradurga (4559 ha), Hiriyuru (2993ha), Challakere (610ha) are leading in area and production of Arecanut. The major horticultural crops are Arecanut, Banana, Mango, Pomegranate, and Coconut. The major field crops cultivated are Ground Nut, Maize, Sun Flower, and Jowar.

### Locale and Research design of the study

The investigation was conducted in the Chitradurga district of Karnataka state. The Ex post-facto research design was followed. Chitradurga, Holalkere and Hiriyuru taluks coming under Chitradurga district were selected purposively based on the highest area under Arecanut production and practicing different irrigation methods viz., Drip, Sprinkler and Flood irrigation methods.

### Selection of Respondents

The study was planned to involve the respondents following different irrigation methods such as drip, sprinkler and flood irrigation in Arecanut cultivation. The 40 drip irrigation adopted farmers, 40 sprinkler irrigation adopted farmers, and the remaining 40 who were following flood irrigation in Arecanut cultivation were selected randomly by getting help of respective RSKs (Raitha Samparka Kendra) of each taluk. Thus, the total sample size for the study was 120 respondents.

## Results and Disscussion

### Constraints faced by the farmers following different irrigation methods in Arecanut

Constraints faced by the farmers following drip irrigation method in Arecanut

The information presented in Table 1 shows that cent per cent of the farmers practicing drip irrigation felt that high cost of initial installation, high cost of maintenance and insufficient ground water as a major constraint. Most of the respondents felt that inadequate credit facility (97.50 %) and equal number of respondent (95.00 %) felt that requirement of clean water and irregular power supply as a constraint. The respondents felt that choking of laterals and drippers (90.00%), poor timely availability of resources (90.00%) was a constraint in drip irrigation. Only 30.00 per cent of the drip irrigated farmers felt that rodent's damage to laterals as a constraint in drip irrigation.

The probable reason might be due to the most of the Indian farmers were depends on agricultural income only, it is difficult for them to adopt technologies having a high cost, and even though farmers owned bore wells but the functioning of bore well is limited. The farmers made a huge investment on bore wells and they are purchasing water for irrigation.

**Table 1:** Constraints faced by the farmers following drip irrigation method in Arecanut n=40

| SL. No. | Constraints | Frequency | Percentage | Rank |
|---|---|---|---|---|
| 1. | High cost of initial installation | 40 | 100.00 | I |
| 2. | High Cost of maintenance | 40 | 100.00 | |
| 3. | In sufficient ground water | 40 | 100.00 | |
| 4. | Inadequate credit facilities to farmers | 39 | 97.50 | II |
| 5. | Requirement of clean water | 39 | 97.50 | |
| 6. | Irregular power supply | 38 | 95.00 | III |
| 7. | Choking of laterals and drippers | 36 | 90.00 | IV |
| 8. | Timely availability of resources | 36 | 90.00 | |
| 9. | Rodents damage to the laterals | 12 | 30.00 | V |

### Constraints faced by the farmers following sprinkler irrigation method in Arecanut

The data presented in Table 2 depicts the constraints faced by farmers of sprinkler irrigation. The major constraints faced by farmers were nozzle blocking (85.00 %), un availability of normal water (82.50 %), un even distribution of water due to high wind current (82.50 %), high initial cost (80.00 %), insufficient ground water (77.50 %), leakage from coupler (70.00 %), lack of incentives for installation (67.50 %), high cost of maintenance (62.50%) and requirement of high water pressure (55.00 %), respectively.

The reasons might be in study area most of the parts of district the water is highly salt contained this may be probable reason for blocking of nozzles. There is a high wind currents which may affect the uniform distribution of water in sprinkler irrigation. Apart from these the initial installation of modern irrigation requires high investment due to its superiority and advantages over other methods. This maybe reason for above constraints faced by sprinkler irrigation farmers.

**Table 2:** Constraints faced by the farmers following sprinkler irrigation method in Arecanut n=40

| SL. No | Constraints | Frequency | Percentage | Rank |
|---|---|---|---|---|
| 1. | Nozzles blocking | 34 | 85.00 | I |
| 2. | Unavailability of normal water | 33 | 82.50 | II |
| 3. | Uneven distribution of water due to high wind current | 33 | 82.50 | |

| | | | | |
|---|---|---|---|---|
| 4. | High initial cost | 32 | 80.00 | III |
| 5. | Insufficient ground water availability | 31 | 77.50 | IV |
| 6. | Leakage from coupler | 28 | 70.00 | V |
| 7. | Incentives for installation | 27 | 67.50 | VI |
| 8. | Cost of maintenance | 25 | 62.50 | VII |
| 9. | Requirement of high water pressure | 22 | 55.00 | VIII |

**Constraints faced by the farmers following flood irrigation method in Arecanut**

A critical look on Table 3 reveals that all of the respondents perceived that high labour cost (100.00 %), insufficient groundwater (100.00 %), poor timely availability of labour (87.50 %), increased weed problem (85.00 %), high cost of maintenance (80.00 %), regular requirement of bund maintenance (77.50 %), leaching of nutrients were high (75.00 %) and more pest and disease incidence (70.00 %) was a constraint in flood irrigation method.

The reason might be due to migration now a day's labour scarcity becomes a major problem, it may available also they are claiming high charges for their work. For watering, for bund construction and weeding, etc., in study area there is a shortage of ground water by over exploitation of water for commercial purpose. Flood irrigation requires high conveyance structures bunds and channels in order to irrigate the crop. This may be reason for above constraints faced by flood irrigation farmers

**Table 3:** Constraints faced by the farmers following flood irrigation method in Arecanut n=40

| SL. No | Constraints | Frequency | Percentage | Rank |
|---|---|---|---|---|
| 1. | High labour cost | 40 | 100.00 | **I** |
| 2. | In sufficient ground water | 40 | 100.00 | |
| 3. | Poor timely availability of labour | 35 | 87.50 | II |
| 4. | Increased weed problem | 34 | 85.00 | III |
| 5. | High cost of maintenance | 32 | 80.00 | IV |
| 6. | Regular requirement of bund | 31 | 77.50 | V |
| 7. | High leaching of nutrients | 30 | 75.00 | VI |
| 8. | More incidence of pest and disease | 28 | 70.00 | **VII** |

**Suggestions given by farmers following different irrigation methods in Arecanut**

Suggestions given by the farmers following drip irrigation method in Arecanut

The suggestions offered by drip irrigation method following farmers to improve the efficiency and effectiveness of drip irrigation in Arecanut were presented in Table 4. Majority of them suggested that MSP facility should be provided for Arecanut (95.00 %), continuous supply of electricity (80.00%). Nearly three fourth of the farmers suggested that there was need to provide subsidy on chemical and fertilizers (72.50 %), there is a need to supply the spare parts of the drip irrigation unit at a reasonable price (72.50 %), need for a locally available technical person for easy maintenance (67.50 %), needs availability of drip irrigation unit at low cost (55.00%) and need for rat proof drip irrigation unit material (47.50%).

Providing price subsidy on drip irrigation unit (95.00 %) was the major suggestion as the modern irrigation methods require high initial investments and farmers cannot afford them for economic use of the scarce resources like water. If any problem in the unit needs time to get it repaired in that period plants may not get water and leads to locally available the problem could be solved in a short period.

**Table 4:** Suggestions given by the farmers following drip irrigation method in Arecanut n=40

| SL. No | Suggestions | F | P | Rank |
|---|---|---|---|---|
| 1. | MSP facility should be provided for Arecanut | 38 | 95.00 | **I** |
| 2. | Regular supply of electricity to farmers | 32 | 80.00 | II |
| 3. | Subsidy on chemical and fertilizers should be given at planting time | 29 | 72.50 | III |
| 4. | Spare parts of drip irrigation unit at a reasonable price | 29 | 72.50 | |
| 5. | Locally available technical person for easy | 27 | 67.50 | IV |
| 6. | Technical knowledge about remedies against | 24 | 60.00 | V |
| 7. | Training programs on improved cultivation under drip irrigation method | 22 | 55.00 | VI |
| 8. | Mechanization for Inter-cultivation should be compatible with drip unit | 22 | 55.00 | |
| 9. | Availability of drip irrigation unit at low cost | 22 | 55.00 | |
| 10. | Rats/rodents proof drip irrigation unit material | 19 | 47.50 | **VII** |

Note: F = Frequency, P =Percentage

Suggestions given by the farmers following sprinkler irrigation method in Arecanut

The suggestions offered by sprinkler adopted farmers to improve the efficiency and effectiveness of sprinkler irrigation in Arecanut. Cent per cent of farmers suggested that there is a need for regular supply of electricity to bore wells and the need for training programmes on improved cultivation practices for sprinkler irrigation method. Majority of the respondents felt that need for alternate method for irrigation under low pressure conditions (97.50%), need for technical knowledge about remedies against clogging (95.00%), need for availability of sprinkler irrigation unit at low cost (95.00 %), need to supply the spare parts of sprinkler irrigation unit at reasonable price (90.00%), mechanized way of maintenance of sprinkler irrigation method (70.00 %). (Table 5)

Providing regular supply of electricity to bore wells (100.00 %) was the major suggestion by farmers. Due to lack of regular power supply to bore wells the farmers cannot be able to irrigate the entire Arecanut field and irregular supply of power leads to miss matching in wetting pattern of the total area. Need for technical knowledge about remedies against clogging (95.00%) which helps to farmers to overcome the clogging and other problems related to sprinkler irrigation. Mechanized way of maintenance of sprinkler irrigation method (70.00%) may help to reduce the labour cost and easy maintenance.

**Table 5:** Suggestions given by the farmers following sprinkler irrigation method in Arecanut n=40

| SL. No. | Suggestions | F | P | Rank |
|---|---|---|---|---|
| 1. | Regular supply of electricity to farmers bore wells | 40 | 100.00 | I |
| 2. | Training programmes on improved cultivation practices for sprinkler irrigation | 40 | 100.00 | |
| 3. | Alternate system for irrigating under low pressure condition | 39 | 97.50 | II |
| 4. | Technical knowledge about remedies against clogging | 38 | 95.00 | III |
| 5. | Availability of sprinkler irrigation unit at low cost | 38 | 95.00 | |
| 6. | Supply the spare parts of the sprinkler irrigation unit at a reasonable price | 36 | 90.00 | IV |
| 7. | Technical knowledge on installation of a sprinkler unit to irrigate under different | 36 | 90.00 | |
| 8. | Mechanized way of maintenance of sprinkler irrigation method | 28 | 70.00 | V |
| 9. | MSP facility should be provided for Arecanut | 26 | 65.00 | VI |

**Note:** F = Frequency, P =Percentage

Suggestions given by the farmers following flood irrigation method in Arecanut

The suggestions offered by flood adopted farmers to overcome the constraints faced in flood irrigation indicated in Table 6. All of the respondents suggested that the need for the regular supply of electricity. Majority of the farmers suggested that they need to have a group approach for efficient utilization of water (95.00%), need of training for effective management of soil crusting and soil reclamation (95.00%). The farmers suggested that the capacity building programme on intercropping and multistoried cropping in Arecanut (90.00 %), they required efficient weed management under flood irrigation (90.00%) and need to give technical knowledge on the storage of water for further use (82.50 %).

Need for training for effective management of soil crusting and soil reclamation (95.00 %) which helps to learn the remedies against to soil crusting and soil reclamation may ultimately contributed in crop yield and efficient utilization of available water. Need to have a group approach for efficient utilization of water (95.00%) may reduce the conveyances losses in flood irrigation by effective and efficient utilization of available water. Capacity building programme on intercropping and multistoried cropping in Arecanut (90.00%) to gain an additional income from intercrops and it makes efficient utilization of water. Require an efficient method of weed management under flood irrigation method (90.00 %), in flood irrigation water is spread to entire cropped and non-cropped areas, in such conditions there is a chance of growing of many unwanted weeds which may require high labour for eradication.

**Table 6:** Suggestions given by farmers following flood irrigation method in Arecanut n=40

| SL. No. | Suggestions | F | P | Rank |
|---|---|---|---|---|
| 1. | Regularly supply of electricity | 40 | 100.00 | **I** |
| 2 | The need of training for effective soil management and soil crusting | 38 | 95.00 | II |
| 3. | Need to have a group approach for efficient utilization of water | 38 | 95.00 | II |
| 4. | Require an efficient method of weed management under flood irrigation method | 36 | 90.00 | III |
| 5. | Capacity building programme on intercropping and multistoried cropping in Arecanut in flood irrigation method | 36 | 90.00 | |
| 6. | Need to give technical knowledge on storage of water for future use | 33 | 82.50 | IV |
| 7 | Subsidy for bore well recharging | 30 | 75.00 | V |
| 8. | The mechanical method of maintaining bunds | 28 | 70.00 | **VI** |

**Note:** F = Frequency, P =Percentage

## Conclusion

The farmers were facing above constraints hence There is a need to conduct capacity building programmes in order to increase the farmers' skills about operational aspects of different irrigation methods. The farmers need to utilize solar power for bore wells in order to overcome the poor timely availability of electricity. At the same time government look upon Incentivization of economically efficient irrigation method and rainwater harvesting for recharging of bore wells by using runoff water as individual farm basis.

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