IRRIGATION FOR INCREASED COCONUT PRODUCTION

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SUMMARY

Rainfall is one of the major factors contributing to the satisfactory growth and production of coconuts. The production of coconuts in the North-Western, North-Central and Eastern provinces is relatively poor, mainly as a result of insufficient rainfall or its uneven distribution throughout the year.

There is experimental evidence to show that the yield of coconut could be increased substantially by providing supplementary irrigation during the drought. Further, irrigation may be beneficial to perennial intercrops grown in coconut lands as a result of the reduced competition for soil moisture. In many areas in the Intermediate and Dry Zones, sufficient ground water is available which could be tapped for irrigating coconut plantations.

Pitcher irrigation is an effective method of irrigating the young palms grown in sandy soils, while basin irrigation is the common method used in mature plantations. In proximity to the sea coast, sea water could be an alternative source of irrigation without any apparent harmful effects to the palms.

INTRODUCTION

More than half the coconut lands are situated in the Intermediate (1250-1875 mm rainfall) and Dry (< 1250 mm) rainfall zones. In this country, coconut is maintained essentially as a rainfed crop. The palm requires an evenly distributed rainfall of about 1500 mm per year or 120 mm per month. However, these conditions do not prevail in many parts of the Intermediate and Dry Zones. Coconut plantations in the North-Western, North-Central and Eastern provinces often experience low incidence of rainfall. Further, sandy soils found predominantly in the North-Western and Eastern provinces have a low water holding capacity and consequently the water table

drops rapidly during dry months. Under these circumstances, irrigation would be a beneficial practice to overcome the adverse effects of drought and increase the production of coconut plantations.

Response of the coconut palm to irrigation have been observed in many countries including Sri Lanka, India and Malaysia (Thampan, 1975). According to Menon and Pandalai (1960), a phenomenal increase in coconut yield has been reported in Sri Lanka through irrigation during drought. Recently, there has been a renewed interest on this subject in view of the uncertainity of rainfall patterns during the last decade or two leading to longer and more frequent dry periods.

NEED FOR IRRIGATION

Soil moisture stress caused by drought effects often limits the growth and nut yields of the palm. In the case of coconuts, it is believed that the variations in production due to weather factors are much more pronounced than in other tree crops. This is mainly due to the fact that reproductive cycle of each coconut crop lasts for about 3½ years from the primordial to maturity stage. Due to the continuous bearing habit of the coconut palm, it usually bears one inflorescence at each month which finally develops into a mature bunch over a period of 12 months. The first 3 to 4 months of the 12 month development cycle is considered as the period most sensitive to moisture stress.

Of all climatic factors, a well distributed rainfall is considered the most significant factor influencing the yield of coconuts (Abeywardana and Fernando, 1963). They reported that the annual or seasonal fluctuations in the coconut crop were almost entirely due to the variation in rainfall. Further, Abeywardana and Mathes (1971) observed that in Sri Lanka, about two thirds of the potential coconut crop is lost due largely to either poor setting or immature nutfall consequent to moisture stress.

In the past, there have been several instances where drought has caused a severe reduction in nut production and, even the death of coconut palms. For example, the drought which affected the Batticaloa District in 1918 has caused the death of many palms (Park, 1932). A similar

outbreak occurred in 1931 in Puttalam where Park (1932) reported that out of 47 palms in one homestead, 27 were found either dead or crownless while another 15 showed symptoms of acute wilting. Park (1934) also stated that the affected palms gave only 30 percent of the average nut yields recorded (3705 nuts/ha/year) over a period of seven years and remained so at least two years after the end of the drought. In the Puttalam District some 300,000 palms have died and another 700,000 adversely affected as a result of four successive dry years from 1947 to 1950 (Menon and Pandalai, 1960). It was reported that the recent drought, which affected Puttalam , caused as many as 46,000 bearing coconut palms to drop their crowns (Anonymous, 1983).

In the absence of a tap root system, the coconut palm has only a limited capacity to draw water from the surrounding soil, thus rendering the palm less tolerant to drought conditions. Therefore it is imperative that coconut growers make a concerted effort to irrigate their holdings located in areas where the annual rainfall is either below 1500 mm or unevenly distributed throughout the year.

BENEFITS OF IRRIGATION

Abeywardena (1979) reported that a two-fold increase in coconut production could be possible by irrigating the palms during drought. He showed that a single dose of 82 gallons (373 liters) of water applied weekly increased the nut yields by 25 to 30 per cent and copra yields by 54 per cent. Similarly, the yield of nuts has increased considerably in irrigation trials conducted in India (Nair, 1979). Nelliat (1968) reported that irrigation also accelerated the growth and early bearing of young palms grown in sandy soils. According to Wardlaw and Mason (1936) nut production as well as the size of nuts have increased due to irrigation in Malaysian dwarf coconuts. In India it was reported that the average yields of tall palms under rainfed conditions (60 nuts/palm/year) could be increased to 90-110 nuts/palm/year by irrigation (Iyer et. al., 1979). Moreover, tall x dwarf hybrid palms provided with irrigation gave an average of 174 nuts/palm/year . Furthermore, Bhaskaran and Leela (1978) observed that in India supplementary irrigation during summer gave an increased yield of 31 nuts/palm in sandy loam soils.

Venkitesan (1973) stated that in India, summer irrigation of coconut palms reduced button shedding, increased the production of leaves leading to early flowering, enhanced female flower production and fruit setting, and he observed that the beneficial effects of irrigation on nut production occurred from the third year of the commencement of irrigation. Abeywardena (1979) observed that yield improvement due to supplemental irrigation could be attributed mainly to an increased number of female flowers per bunch, production of more bunches and mature nuts per palm, and an increased size of nuts.

Thampan (1975) reported that the beneficial effects of irrigation would be pronounced in shallow and well drained soils, particularly in sandy soils where moisture retention capacity is rather low. Furthermore, Nelliat (1968) showed that the application of red earth to planting holes in sandy soils helped the retention of adequate moisture around the young palm.

WATER REQUIREMENT FOR IRRIGATION

The relatively low water requirement of the coconut palm (2 to 3 acre feet per year) makes it a potential crop to be grown under irrigation. The actual quantum of water required by the palm depends mainly on the length of drought period and soil type.

Espino and Juliano (1924) reported that in the Philippines young coconut palms require 3.5 gallons (16 litres) of water per day. According to Nelliat (1968) irrigation of young palms twice a week with 5 gallons (22.5 litres) of water per irrigation is the normal practice in India. Nelliat also showed that more frequent irrigation with a lesser amount is advantageous for optimum utilization of water in sandy soils. Further, Thampan (1975) recorded that four year old palms grown in sandy loam soils required 20 litres of water every four days to maintain a satisfactory growth.

Copeland (1931) observed that a mature coconut palm loses about 10 gallons (45 litres) of water each day. Results of the trial carried out by Abeywardana (1979) in the Intermediate Zone of Sri Lanka showed that 82 gallons (373 litres) of water applied once a week to mature palms gave not only a better yield response than the non-irrigated control, but also reduced the seasonal fluctuations in coconut yield. The

average water requirement for irrigation of mature palms at four stations namely, Lunuwila, Madampe, Ambakelle and Puttalam is estimated at 1.287, 1.620, 2.142 and 2.094 acre feet of water per year. On this basis, the optimum water requirement for a coconut palm having a basin of 6.5 feet radius would be 1059, 1333, 1762 and 1723 gallons per year, respectively.

Where fresh water is scarce as in the Dry Zone, sea water could be used to irrigate coconut groves along the sea coast. Trials conducted in India have shown that irrigating coconut palms with sea water is as effective as using fresh water in sandy soils (Thampan 1975). In fact sea water is used extensively for irrigating palms along the coastal belt of India, without any apparent ill effects (Menon and Pandalai, 1960). They further reported that the use of sea water for irrigation during the drought actually improved the growth and production of coconuts. According to Pomier and Brunin (1974), the yield of sea water irrigated palms grown in the Ivory Coast increased by 30% for the first 2 years and by 60% for the 3rd year, compared with non irrigated palms.

METHOD OF IRRIGATION

Where fresh water is scarce as in the North-Western and Eastern provinces of Sri Lanka, it would be prudent to adopt pitcher irrigation in young coconut plantations. It is a cheap and effective method of irrigating the young palms, especially in sandy soils. In this method two unglazed clay pots of about 30 cm diameter and 4.5 to 9.0 litres capacity are buried in pits (90 cm diameter and 60 cm in depth) up to the neck and filled with water once a week. Experiments conducted in India have demonstrated that around each pot, moisture spreads to a depth of about 1.0 metre and a circular area about 0.5 metre in diameter.

Basin irrigation is the most suitable and economic method of irrigating mature palms. Here, shallow basins with a radius of 3 to 4 feet are dug around the palm and water is let in. To improve the efficiency of irrigation in sandy soils, it is desirable to add 8 to 10 baskets of silt to the basin around the palm and cover with a 6 inch of straw or weed trash before irrigation.

CONCLUDING REMARKS

The above account clearly shows that an appreciable loss of the potential coconut crop due to drought in marginal rainfall areas (< 1500 mm per year) could be saved by supplementary irrigation. Further, perennial intercrops (e.g. coffee, cocoa, pepper, cinnamon, citrus, banana, pineapple, passion fruit) grown in coconut plantations could also benefit from supplementary irrigation. In many areas in the Intermediate and Dry Zone, sufficient ground water is available for irrigation (Fernando, 1983).

Venkitesan (1973) stated that the extra cost of providing irrigation could be recovered from the extra income earned as a result of increased nut production. According to Bhaskaran and Leela (1978) the cost benefit ratio of irrigating coconut was estimated at 1:3.

Further, growing coconuts under irrigation is a necessity in the Dry Zone and in the newly developed lands in the Mahaweli. The extent of new land in the Mahaweli that should be brought under coconuts to satisfy the dietary needs of about 2 million people is estimated at around 80,000 acres (Fernando, 1984). The main areas that have a potential for irrigated coconuts in the Mahaweli are the systems 'A', 'B' and 'C'. Therefore there is a tremendous need and scope for irrigated coconuts in the Intermediate and dry Zone, both in existing and newly opened lands.

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