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A REVIEW :

Pokkali rice cultivation in Kerala

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SUMMARY : Rice is the staple food of majority of the world population. Rice is grown in large number of countries. In Asia, rice has been cultivated for more than 10,000 years. Among the various traditional systems of rice cultivation, the water logged Pokkali rice cultivation are centuries old organic system. This system utilizes the symbolic relationship between rice and prawns. This is a natural system of cultivation which relies upon monsoons and sea tides. Rice resides form feed for prawns and prawn excrement forms fertilizer for rice, which makes it ecologically stable and also reduces the input. Pokkali system has naturally evolved in the central strip of Kerala, southernmost state of India. The area where the system evolved is unique in its ecological features highly suitable for rice cultivation. The present social and economic system makes it very difficult for maintaining the system in its original form. Even with government efforts to promote the organic system, the Pokkali fields are diminishing at an alarming rate. The traditional system of rice cultivation, Pokkali has to be conserved as an agricultural heritage of Kerala.

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BACKGROUND AND OBJECTIVES

Rice is grown in more than 100 countries across the world, which accounts for about 150 million ha. Asia, the home of 60 per cent of the earth's population, produces more than 90 per cent of the world's rice. Rice is life, to the people of Asia; rice is part of culture and a tradition for millions of people. Rice has been grown in Asia for more than 7000 years (Rice, 2009). 44.6 million hectares of rice area is in India, with a production of 93.3 million tons in 2001-02 (Gayatri and Raveendran, 2009). On national basis, there is an increase of 1.5 million hectares, leading to an increase in production by 1 million tons by 2008-09 (Press information Bureau of India, 2009). Even though the area and production of rice in India is on an increasing phase, it is not the case in the state of Kerala, one of the major rice producing tracts of India.

Kerala is a narrow coastal strip located on the south west of India. It is bounded by the Western Ghats on the east and the Arabian Sea on the west. The state is about 580 km long and 130 km wide. Temperature ranges from a minimum of 19^0 C to a maximum of 37^0C and having a rainfall range of 1943-3667mm during a year. Even though Kerala is one of the smallest states of India having a geographical area of 38863km^2, it has a diverse topography ranging from sea level to

an altitude of 2690m (Balchand, 1983). Kerala has a rich topography of a low lying coastal belt and mountainous ranges of the Western Ghats. This diverse topography with varying climatic and soil conditions enables the people to cultivate a variety of crops like rice and coconut in coastal areas and spices, tea, coffee, rubber in the high ranges. Rice accounts for about 95 per cent of food grains produced within the state (Thomas, 2002).

Rice is grown in uplands and in low lying areas in Kerala. The various cropping systems of rice in Kerala include mixed varietal cropping of rice, intercropping with other crops, relay cropping, sequential cropping and rice under integrated farming systems (Rice cropping systems, 2009). The tidal wet land ecosystem mixed with the deep water status is an ecological situation found in the Kuttanad region of Kerala (Fig.1). Deep water rice or floating rice is an adaptation of rice which is grown in areas where flooding depth of 50 cm for a period of more than 1 month during the growing season is noticed (Catling, 1992).

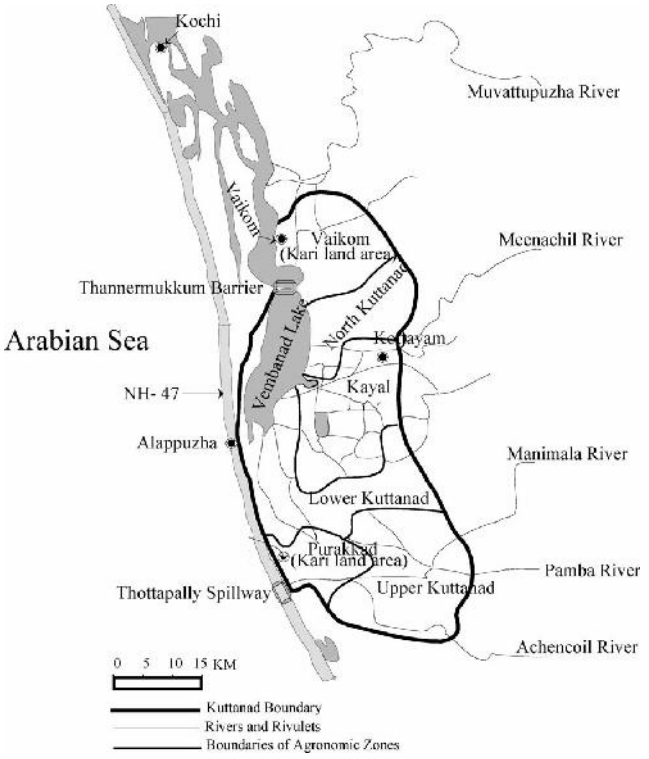

Fig. 1 : Geographical location of Kuttanad tract (Mathew, 2004)

Rice bowl of Kerala :

Kuttand and Palakkad regions form the major rice growing tracts of Kerala. Kuttand region is designated as the "Rice bowl of Kerala", accounting for about 20 per cent of rice production of the state (Thomas, 2002). Kuttanad is a low lying area of 875 km^2 distributed among the districts of Eranakulam and Alapuzha. The Greater Kuttanad region is having a geographical location of $9^0 17^1$ N to $9^0 40^1$N and $75^0 19^1$E to $76^0 33^1$ E (Padmanabhan *et al.*, 2001). The major portion of Kuttanad region lies from 0.6 to 2.1 meters below mean sea level, which is reclaimed land from Vembanad Lake. This cultivable region experiences many natural events like severe floods during the south west monsoon period from July – August, discharges by the four rivers Manimalai, Meenachil, Achencovil and Pamba and during summer the tidal intrusions of saline water is also predominant (Fig.1) (Balchand, 1983). These floods bring nutrient rich alluvial sediments along the rivers from the Western Ghats to be deposited in the low lying areas. The tidal swamps which develop because of the floods and tidal intrusions are very suitable for rice cultivation, especially deep water rice. The varieties grown are salinity resistant. Fisheries is also a major occupation in the deeper parts of this wet land eco-system (Maliyakkal and Thomson, 2008).

The Kuttanad tract has a soil which is a mixture of sand and clay in varying proportions. The entire wet land area is divided into *kayal* lands (lands in backwaters), *karappadams* (shallow reclaimed lands) and *kari* lands (swampy areas with black peat soil being highly acidic) based on the type of soil. The paddy lands in Kuttanad region is divided into contiguous blocks called "Padasekharams". The Padasekharams are bound by waterways and natural partitions, which have a size ranging from less than one ha to 1000 ha (Thomas, 2002).

Pokkali system of rice cum fish cultivation :

Pokkali cultivation can be considered as man's ingenuity in harnessing natural events for farming. It is a system of integrated farming, which does not affect the natural ecological processes. This system does not require any external inputs (Kerala State Biodiversity Board, 2009). Pokkali is a unique system which combines rice cultivation as well as prawn culture in the same field. Traditionally only one crop of rice is taken in a year; the rest of the season prawn farming is done in a traditional manner. The main farming practice of Kuttanad area is rice cum fish culture in the traditional paddy fields. The farmers use a native variety for rice cultivation known

as Pokkali having duration of 120 days (Kumary, 2007). This variety is effectively resistant to flood and salinity. The plant grows to a height to 1.5 m. Other varieties which are being used include Chettivirippu, Vyttila 1, and Vyttila 2 (Kerala Agricultural University, 2002).

Pokkali paddy :

The preparation of Pokkali system of rice cultivation starts in the month of May. Initial work starts with raising bunds followed by making mounds of 1 m^2 base and 50 cm height (Fig. 2) (Kerala Agricultural University, 2002). The mounds are allowed to dry by preventing the entry of water into the fields. With the south west monsoons down pouring, salts and toxic elements are washed off from the mounds and drained off. On these mounds, sprouted Pokkali seeds are sown (Fig. 2). The seeds are sprouted by tightly packing them in baskets of coconut leaves with an inside lining of banana or teak leaves and soaking in fresh water for 12 to 15 hours (Thomas, 2002 and Paimpillil, 2007). After a month period, the mounds are leveled off. The seedlings on the mounds are spread uniformly in the field. The seedlings grow quickly and get established in the field and withstand floods that follow (Virtual University for Agricultural Trade, 2009). The crop will be ready for harvest within 4 months and harvesting is mainly down using boats (Fig. 3).

Fig. 2 : Established seedlings on the mounds. Paddy fields are reclaimed for construction of houses. Source: *http://good-times.webshots.com/photo/1263710904065156245xaeDBr*

Prawn cultivation :

After the harvest of the crop, the pokkali fields are

Fig. 3: Transporting the harvested Pokkali rice crop.Source : *http://www.thehindu.com/mag/2007/08/26/stories/2007082650070400.htm*

used for fish or prawn cultivation. This method of rice-fish farming has been done for centuries, which maintains an ecological balance and also provides remunerative returns to the farmers. The prawn farming is generally done during November to April. After the monsoon period, the canals and backwaters of this region become saline and large quantities of juvenile prawns and fingerlings of other fishes enter these canals. The juvenile prawns are guided into the pokkali fields by means of water channels having a head at its gate (known as sluice gates) and the gates prevent them from moving out. This is known as prawn culture filtration, and locally known as "chemmeenkettu" in pokkali fields (Thomas, 2002 and Paimpillil, 2007). The prawns and fish grow in the field providing additional income to farmers. The left over residues of rice cultivation act as natural food for fish farming (Fig. 4). The prawns feeding on the stubbles of rice cultivation helps to keep the disease incidence in the following crop of rice to a minimum as well as the prawn execreta is a good natural fertilizer for the rice crop.

The sluice gates are important in prawn farming in maintaining the inflow and out flow of water throughout the farming season. These are maintained in such a way as to provide maximum entry of saline water into the

Fig. 4 : Residues of paddy field, natural food for prawns (Source: *www.vuatkerala.org/.../fw_prawns/farming.htm*)

fields and preventing the escape of fish from the field while maintaining maximum water exchange. Harvesting coincides normally at the time of low tides. The prawns and fish are caught in the sluice nets locally known as "thoombuvala" (Paimpillil, 2007). White prawns (Naran) and tiger prawns (Kara) are the major cultivated prawns (Fig. 5 and 6). Until the middle of April, prawns are harvested especially 2-3 days before the new and full moon days, as tidal activity has an impact on the movement of prawns. In general, during the low saline phase the paddy cultivation is done, whereas prawn cultivation is done during the high saline phase (Shylaraj and Sasidharan, 2005 and Francis *et al.*, 1999).

Important dates and times in Pokkali cultivation

April last week	Drying up the lands, strengthening of bunds
June 1st week	(Depends upon rain) Leveling the tops of mounds and sowing
July/August (after 28 days)	Replanting rice
August	Removing of weeds
October/November	Harvesting rice
November 15th	Prawn filtration starts/fixing sluices
November last week	Prawn siblings are introduced into the field
After 69 days	*Penaeus indicus* (Naran) harvest starts
After 90 days	*Penaeus monodon* (Kara) harvest starts
April 13th	Final harvest of prawns

Source : *http://www.capemalta.net/pim2007/proceedings/Theme%203/Theme%203%20-%20Women%20Ocean%20Causus.pdf*

Impacts of Pokkali cultivation :

The best utilization of ecological cycle takes place in Pokkali fields making it environmental friendly. Absence of the use of chemical fertilizers and pesticides makes it an organic rice production system with less

Fig. 5 : *Penaeus monodon* (Kara) (Source : *http://www.babymarinegroup.in/products/shrimp-head-on-shell-on*)

Fig. 6 : *Penaeus indicus* (Naran) (Source : *http://www.babymarinegroup.in/products/shrimp—head-on-shell-on*)

expenditure compared with normal rice cultivation. The major environmental concerns of loss of biodiversity, over exploitation of natural resources and coastal degradation are not present in this system. This system is an eco-friendly cultivation practice (Paimpillil, 2007).

Present status of Pokkali cultivation :

The present day concerns in Pokkali cultivation is lack of farm labor and economic inviability, which makes the farmers reluctant to practice this centuries old system of Pokkali cultivation. Since the rice-fish cultivation depends on the proper combination of rain and tides, due to the present climatic changes, there is concern about the unpredictability of the system. Planning and construction of spillways for more rice production in Kuttanad area was not done in a planned manner resulting in environmental problems and socio-economic disasters (Balchand, 1983). The total area under Pokkali cultivation of 25,000 ha has reduced to 5,500 ha in the last few decades (Rice, 2009). The real estate boom has resulted in reclamation and drainage of most of the Pokkali lands for the construction of houses and multi storied residential flats (Fig. 2). A stage has been reached in which Pokkali,

the traditional agricultural system of Kerala has to be protected as an agricultural heritage of Kerala (Kerala State Biodiversity Board, 2009).

REFERENCES

Balchand, A.N. (1983). Kuttanad: A case study on environmental consequences of water resources mismanagement. *Water Internat.*, **8**(1):35-41.

Catling, H.D. (1992). *Rice in deep water*. IRRI. Macmillan Press: London. Pages 213-243.

Francis, G., Focken, Ulfert and Becker, Klaus (1999). A traditional rice-prawn rotation culture system from Kerala state, India. Session: Sustainable Technology Development in Animal Agriculture, Deutscher Tropentag, Berlin.

Gayatri, R.N. and Raveendran, K. (2009). Exploration of untapped potentiality of coastal paddy fields of Kerala (India) - A case study. *Middle-East J. Scientific Res.*, **4** (1): 44-47.

Kerala Agricultural University. (2002). *Package of practices recommendations: Crops*.12th edition. Kerala Agricultural University, Trichur. 278 p.

Kumary, S.L. (2007). Rice varieties:Kerala's special. *Kerala Calling*. **27**(12): 16-18.

Maliyakkal, G. and Thomson, K. (2008). Water sharing institutions in complex coastal commons: A study of Cochin Estuary, Kerala, India. 12th Biennial Conference of the International Association for the Study of Commons, Cheltenham, England.

Mathew, E.K. (2004). Adaptability constraints of a technically and economically feasible subsurface drainage system in the low-lying acid sulphate soils of Kerala, India. *Irri. & Drai. System*, **18** : 329-346.

Shylaraj, K.S. and Sasidharan, N.K. (2005). VTL 5: A high yielding salinity tolerant rice variety for the coastal saline ecosystems of Kerala. *J. Tropical Agric.*, **43** (1-2): 25-28.

WEBLIOGRAPHY

http://www.thehindu.com/mag/2007/08/26/stories/2007082650070400.htm

http://good-times.webshots.com/photo/1263710904065156245xaeDBr

http://www. babymarinegroup.in/products/shrimp—head-on-shell-on

Kerala State Biodiversity Board. (2009). Avaliable at http://*www.keralabiodiversity.org/pdf/policy.pdf accessed on 11/02/09.*

Padmanabhan P.G., Narayanan, N.C. and Padmakumar, K.G. (2001). Economic Viability of an Integrated and Sustainable Resource Use Model for Kuttanad Discussion Paper No. 33. A Project of Kerala Research Programme on Local Level Development (KRPLLD), Trivandrum. Avaliable at http://*www.krpcds.org/reportleft.htm accessed on 11/02/09.*

Paimpillil, J.S. (2007). Eco-friendly prawn farming with *Pokkali* cultivation – Role of women and children in coastal resource management and poverty reduction. Proceedings of Pacem in Maribus XXXIII Conference,Corinthia Palace Hotel, Attard, Malta. Pages 274-280.

Press information Bureau of India (2009). Available at *http://pibmumbai.gov.in/scripts/detail.asp?releaseId=E2009PR1206 accessed on 11/15/09.*

Rice. (2009). Available at www.ricewisdom.org, accessed on11/01/09.

Rice cropping systems. (2009). Available at *http://agropedia.iitk.ac.in/?q=content/rice-based-cropping-systems, accessed on 10/28/09.*

Thomas, P.M. (2002). Problems and prospects of paddy cultivation in Kuttanad region. Discussion Paper No. 82. A Project of Kerala Research Programme on Local Level Development (KRPLLD), Trivandrum. Avaliable at *http://www.krpcds.org/reportleft.htm, accessed on 10/25/09.*

Virtual University for Agricultural trade. (2009). Avaliable at *http://www.vuatkerala.org/static/eng/advisory/agri/rice/cultivation%20practices.html accessed on 10/28/09.*

www.vuatkerala.org/.../fw_prawns/farming.htm

www.babymarinegroup.in/products/shrimp-head-on-shell-on)