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Integrated farming systems for sustenance of environment and rural livelihoods: A review

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Abstract

Mounting population pressure and attendant problems of poverty and malnutrition as often referred "tragedy of the commons" pose a grim developmental scenario across the country. Agriculture largely forms one of the important non-point sources of environmental pollution, which can be tackled by resorting to suitable Integrated Farming Systems (IFS). In IFS inputs, outputs, resources and wastes are recycled between different components of the system and thereby ultimate waste generation reduced greatly. Various aspects on IFS including technological and socio-economical benefits in plains have been researched as early as 1970s by different research and development Institutions of the country under Indian Council of Agricultural Research (ICAR), State Agricultural Universities (SAUs), general universities and other related establishments. Nevertheless, the takeoff and desired percolation of IFS could not be realized throughout the country, may be due to various socio-economic, political and technical factors. Thus, location-specific IFS in foothills and mid-hill Himalayan watersheds were studied to maximize water productivity, agriculture-based goods and services from judicious resource use. Watermill-based IFS developed in a mid-Himalayan watershed has the potential to yield 40-50 kg fish/m^2, 200-250 kg live weight pigs for pork within 6-7 months, 500-650 kg poultry meat and 20-38% additional grain or vegetable yield over and above income received from tradition watermill (Rs. 10,000). Farmers can recover initial investments within a period of 3-4 years with overall B:C ratio of 1.9:1. The system recycles resources (wastes and water) between components synergistically. Wastes from about 100-150 poultry birds and 3-4 pigs suffice the feed and fertilizer needs of 150-200 fish and crops in 1000 m^2 area with minimum external feed and fertilizers. Fish culture in paddy fields with a loss of 4 % paddy area allocated for refuge pond and trenches yielded about 600-900 kg fish ha^{-1} $year^{-1}$. An additional net profit of about Rs**.** 600-800 per 100 m^2 is realized from paddy fields on integration of fish culture with bare minimum inputs such as fish seeds, feeds and screen or nets at a unit cost of Rs. 120 per 100 m^2. Besides, about 15-20 % improvement in paddy yield over non-integrated fields is possible mainly due to synergetic benefits of the integration. Fish excreta serves as a rich source of manure. Overall, IFS have proved as one of the potential farming systems for the benefit of both environment and rural livelihood security. Importance of various IFS, potentials, present status and strategies needed were illustrated with few models of IFS have been reviewed here for a focused discussion.

Biography

M. Muruganandam has completed his MSc (Mariculture) from CMFRI, ICAR and Ph.D. from HNB Garhwal (Central) University. He is Sr Scientist (Fisheries) at CSWCRTI, ICAR. He has over 17 years of research experience and has formatted Watershed-based fisheries and aquaculture research and training programs under integrated natural resource management at the Institute with national mandate. He has completed 13 research projects and developed/refined 6 fisheries and livestock based production technologies. He has published more than 10 research papers in reputed journals, 2 thesis and 50 technical papers in various books, reports, popular journals and documents. He has organized a number of trainings, camps and field demonstrations to various stakeholders on integrated farming and watershed-based fisheries and livestock development. He has given lectures in about 50 national and international training and extension programs as resource person/faculty. Attended over 70 national and international conferences/Symposia besides many technical Workshops and Meetings to present research papers and co-chaired few sessions.