“Integrating energy conservation practices towards sustainable agriculture: the case of small farms in India”

April 2010

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Abstract

The project objective was to demonstrate improvement in the efficiency of energy-resource use in agriculture, and thereby conservation of resources and sustainable improvement in livelihoods, integrating benefits for the rural folk, the infrastructure utilities, and the environment. This Report describes the project; it was selected for funding by the Wuppertal Institute at the through the 5th Round of their Sustainable Energy Project Support Programme.

The planned demonstration of improved farming practices was implemented at a sample of 50 farms located in the Tumakooru and rural Bengalooru (now called Ramanagara) districts of Karnataka state. The main activities during the year-long project included: assessment of baseline resource use, installation and operation of efficient resource-use systems, and monitoring and assessment of post-efficiency-improvement resource-use.

The assessment of baseline cropping patterns and fertilizer use were on the basis of answers to questionnaires. However, to measure the electricity used for pumping water for irrigation, energy meters were installed, while the water pumped was estimated by the discharge rate method. Once the baseline resource use was evaluated, a series of resource-efficiency improvements was implemented. These included efficient water-pumping, efficient water application through micro-irrigation (drip and sprinkler) systems, and cost-effective and environmentally-beneficial soil enrichment. For energy-efficiency, all the existing pumps were replaced with new efficiency-certified multi-stage submersible pumps, while those without any irrigation were provided with shared access to irrigation wells with efficient pumps. For water-conservation, each farm was provided with sprinkler and/or drip systems for a specified acreage. For natural soil-enrichment, three options – rotating the usual crops with a leguminous crop, inter-cropping of a plantation with leguminous plants, and generation of natural manure, were adopted.

Post-installation, resource-use was re-assessed using the same methods as for the baseline. Noteworthy aspects include: the reduction of electricity use by 41.5% for the pre-irrigation farms, and 31.4% for the sample (because of additional provision of irrigation to un-irrigated farms), and reduction of water use by 60% at the fields provided with micro-irrigation, and 22% for the sample as a whole. Important conclusions were that improved efficiency can provide for extension of irrigation and increased output without increasing, and even reducing, the total water/energy requirement in the locality, and shared-access enables greater equity and improved livelihoods. However, successful functioning of efficient improvements requires that conditions -- such as appropriate training of the farmers and local mechanics – be fulfilled.

Keywords: micro-irrigation, farm energy assessment, energy-efficient farming practices, sustainable farming, shared water access

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