

## 4.5 Sub-surface Drip Irrigation and Potential for Diversification in Cropping Systems

*Targeted irrigation and crop diversification could maintain farmer incomes and meet consumer demand. Despite the immediate challenges of reducing water used in the dual cropping wheat and rice paddy system, there is a need to sustain farmer incomes and meet consumer demand. Research being undertaken at PAU under the programme has identified alternative cropping systems which could meet the expectations for increased profitability and reduced water use.*

### Evaluating the impact of diverse cropping systems for farmers and State Policy makers

Research led by the Punjab Agricultural University and the University of Cambridge combined empirical field studies and agricultural economic modelling to compare input demands for differing drip irrigation strategies and seasonal crop combinations. Alternative crop combinations and irrigation strategies were identified for transitioning towards more sustainable agricultural supply chains. Outputs from these studies were benchmarked against paddy rice production in terms of subsurface irrigation water demand, yield, and overall financial return.

Additionally, outputs were projected against future market demand, given societal changes in consumption patterns, to advise on policies for more sustainable cropping systems. The research results strengthen agricultural resiliency in terms of reduced resource inputs and alternative product supply chains. In addition, export opportunities and replacement of imports were considered, along with the ease of cultivation and opportunities for mechanisation.

*“Ultimately, we need water conservation as a mainstream agenda for public policy in Punjab, and through various interventions, (crop diversification, conservation technologies), and a very strong extension system, develop an extensive dialogue with the farmers”* **Anirudh Tewari, Chief Secretary, Govt of Punjab, TIGR2ESS Policy Fellow**

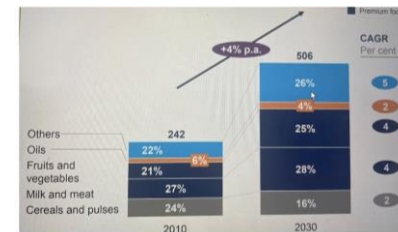
### Seasonal Crop Combinations Plan for Diversification Scenarios

Cropping combinations included rice, potato and spring maize, or cotton and canola. These were tested under three irrigation regimes, including conventional flood irrigation and the installation of a sub-surface pipe network for drip irrigation.

Key findings indicated that nearly all cropping combinations produce equivalence to paddy rice in terms of standardised yield, with scenarios producing markedly increased financial returns. All cropping systems benefitted from sub-surface drip irrigation, which reduced groundwater water demand by between 34 and 46%.

Researchers concluded that diversification could meet demands for milk, oils, fruit, and vegetables and reduce the extent of wheat and traditional paddy rice, that dominate agricultural production. Alternative crop variants, e.g. basmati rice (lower water requirements, higher returns) as well as maize, cotton, and canola were considered. Other attractive cropping possibilities included pulses and dairy production.

## Surface drip irrigation at Level 2



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LEAD INVESTIGATOR & CO-INVESTIGATORS:	Sandeep Kapur (Punjab Agricultural University), Ajmar Brar (Punjab Agricultural University), Jagjit Singh Srail (University of Cambridge), Naoum Tsoiak (University of Cambridge)
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