Management response to An Assessment of the Impact of Laser-Assisted Precision Land Levelling Technology as a Component of Climate-Smart Agriculture in the State of Haryana, India

May 2015

CCAFS Program Management Committee

Management response statement:

This is a strong ex-post Impact Assessment of the impacts of Laser-Assisted Precision Land Levelling (LLL) in Karnal District, Haryana State, India. The study considers impacts on adaptation, mitigation and food security variables, as well as economic performance. The study makes a convincing case for the CSA benefits and scalability of this technology among larger-scale farmers, with an analysis of benefits for poorer farmers. It shows positive impacts of technology adoption on economic performance, mitigation (fuel savings, urea savings, lower soil emissions), adaptation (irrigation savings) and food security (yields and food availability). The study could be published in a peer-reviewed journal. What is less clear from the study is the CIMMYT contribution to the impacts and the ratio of benefits to CIMMYT/CCAFS investments.

Notes on the study:

- Best of the impact studies submitted by Centres in 2014
- Covers all three CSA outcome areas
- Good wide-ranging analysis of employment, gender and equity benefits
- A good example to share with other centres

Interesting findings:

- "Area under LLL in Haryana is conservatively estimated at just over half a million hectares, and the number of machines in the State is up to 2,000 and growing exponentially"
- Calculations of economic performance under different scenarios (e.g. technical, subsidies) – "The IRR of an investment in LLL equipment ranges from 120 per cent with diesel low lift pumps to 115 per cent with tubewells. In both cases the payback time is less than a year." Note impressive speed of return on investment.
- Mitigation benefit: "A conservative estimate of the reduction in annual GHG emissions across the State as a result of levelling is 63,600 MT of CO2eq." (per year)
- Also further GHG reductions due to less application of urea and hence lower N2O emissions, plus fuel savings: "an annual fuel saving of 7.5 million litres of diesel, which lowers emissions by 19,500 MT of CO2 per annum"
- Adaptation benefit: "The most conservative estimate is that the amount of irrigation water presently saved by LLL is 933 million m3/annum."
- Food security benefit: "The 2011 estimates were post-LLL yield increases of 2.85 qtl/ha in wheat and 3.22 qtl/ha in rice. Taking the conservative estimated area of 544 thousand hectares laser levelled across the State, such yield increases translate into additional production of 155and 175 thousand MT per annum of wheat and rice respectively. This represents a significant increase in the food availability aspect of food security."

- “Studies show that these increases do not result from augmented application of agricultural inputs such as nitrogenous fertilizer, water and fuel. Rather the reverse. Hence, when translated from absolute terms into terms of mitigation and adaptation *per unit of food produced*, the climate change mitigation and adaptation effects are even greater than those reported above.”
- Equity effects: LLL farmers tend to be richer and with larger land holdings; poor people likely to benefit most through indirect impacts on higher food availability and mitigated climate effects
- Technically the smallest plot that can be levelled is 0.1-0.2 ha
- “Some evidence has emerged of feminization of agriculture in areas where vegetables are replacing cereals in rice-wheat systems after LLL.” But the statement was from only one respondent
- Expect LLL to improve success of other CSA technologies e.g. crop diversification, raised beds, Nutrient Manager, turbo seeders