

Conservation Agriculture and Welfare: Evidence from Ethiopia

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Motivation

- More than one billion people in the world heavily rely on their soil to produce what they eat and support their welfare
- Soil degradation and low productivity, food insecurity
- (Poor) soil management practices?

- Adoption of sustainable practices as a way to promote soil health and its productivity (in the short, medium and in the long run)
- Conservation ag of soil via better management in agriculture
- Crop rotation and minimum tillage
- Key for sustainable development

Does it work? Existing (Econ Related) evidence

- Large body of (mixed) evidence
- Very large positive effects to very small (Pittelkow et al., 2015)
- Small sample studies, no long time span
- More observational studies (Kassie et al, 2013; Michler et al. 2019, Maggio et al., 2021)

This study

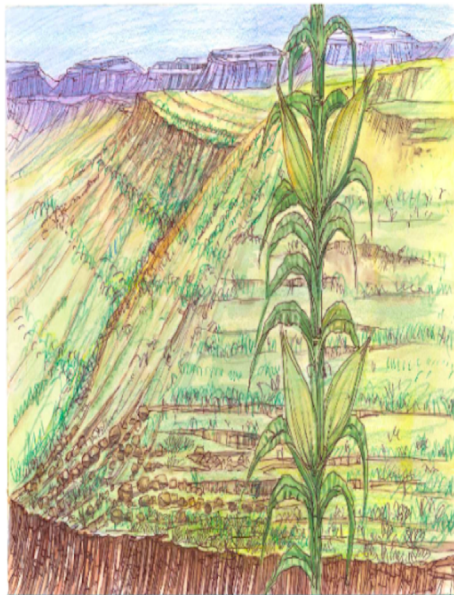
- A set of RCTs to determine the impact of soil management practices on productivity after one year, two years, five years
- Treatment: field day to learn about sustainable land management (Conley and Udry, 2010; Ben Yshay and Mobarak, 2018; Emerick and Dar, 2022)
- Very detailed information
- Outcome: Agricultural output per ha (soil productivity)

Providing detailed information

- Study in 2013 to map uptake and estimated expected pay offs



a



b



c



d

Contributions

- Nature's contribution to welfare (Dasgupta, 2001; 2014, Dasgupta and Heal, 1978; Ferraro et al., 2019; Kassie et al, 2013; Michler et al. 2019)

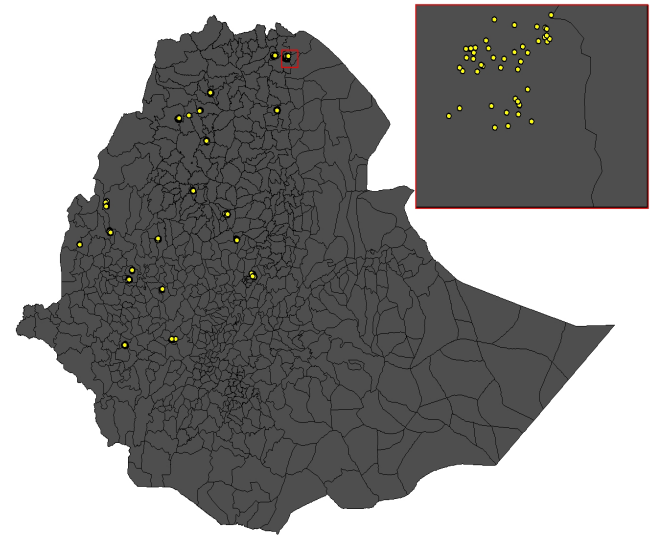
=> Micro and causal

- Learning (Foster and Rosenzweig, 1995; Bandiera and Rasul, 2006; Conley and Udry, 2010; Krishnan and Patnam, 2014; Beaman, 2018)

=> longer run, more complex technology

Area and design

- Randomly selected sample of farmers in 80 cereals growing villages in Ethiopia
- Representative of the main types of agriculture/agroecologies

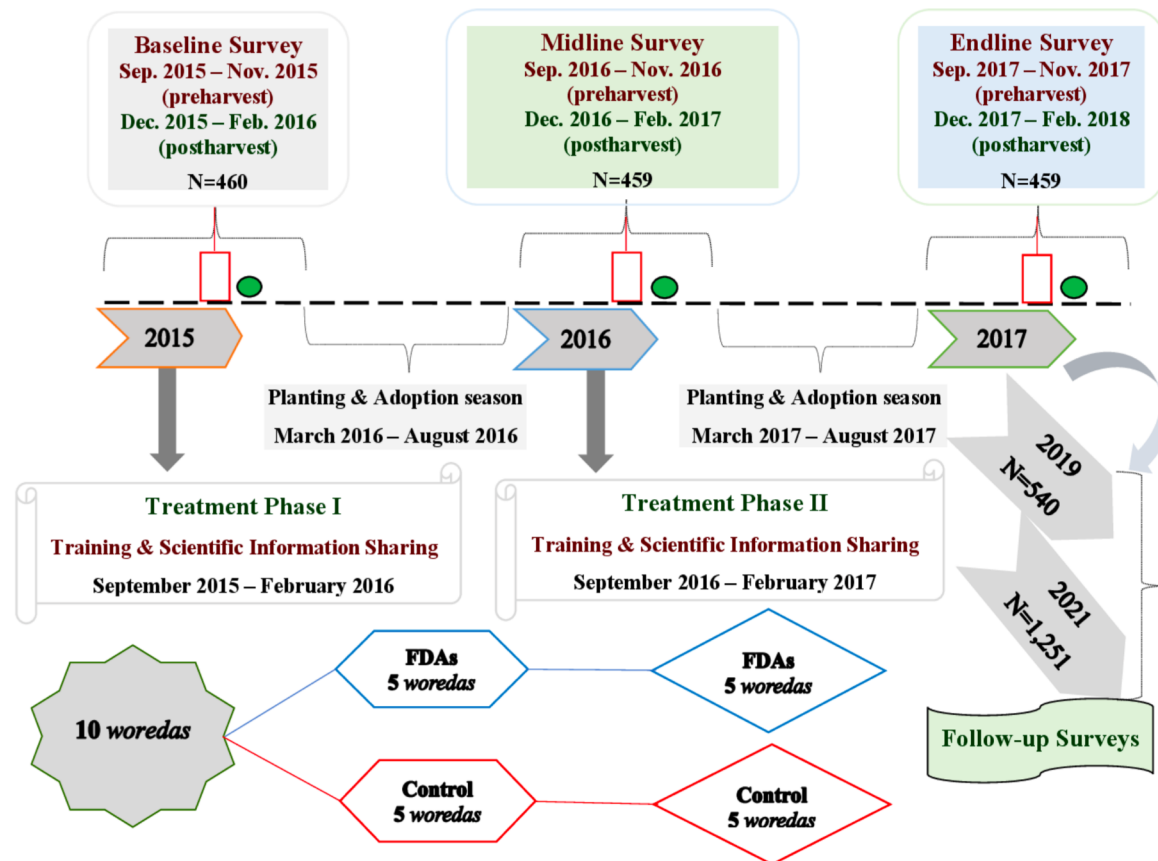


- 50% treatment (invitation to attend a field day)
- 3h info sustainable practices and its potential economic impact (according to studies and/or peer experience) provided by our enumerators
- 50% control
- Average compliance 46%

Sustainable practices package

- Crop rotation with legumes (after first growing season and beyond)
- Minimum tillage (after first growing season and beyond)
- At the baseline 30% adopters

Timing



$$Outcome_{ijt} = \beta_0 + \beta_1 FieldDAY_{ij} + \beta_i X_i + \nu_t + \epsilon_{ij}$$

Table 1: Baseline summary statistics

	Full Sample	Field day	Control	Difference
	(1)	(2)	(3)	(4)
Panel A. Outcome variables				
Yield (kg/ha)	2243.300 (1837.4)	2262.078 (1843.4)	2225.395 (1835.8)	36.68 (179.569)
Productivity	2528.021 (1440.4)	2550.169 (1425.7)	2506.903 (1457.3)	43.27 (140.758)
Panel B. Additional controls				
Average age	26.844 (10.64)	26.935 (10.80)	26.752 (10.50)	0.183 (0.995)
Education	8.026 (3.230)	7.861 (3.470)	8.192 (2.967)	-0.331 (0.301)
Land endowment	1.898 (1.303)	1.748 (1.247)	2.047 (1.342)	-0.299** (0.122)
Plot size	0.957 (0.660)	0.935 (0.606)	0.978 (0.709)	-0.0427 (0.065)
Oxen	1.473 (1.388)	1.261 (1.168)	1.686 (1.552)	-0.425*** (0.128)
Donkeys	0.608 (0.927)	0.670 (0.973)	0.546 (0.876)	0.124 (0.086)
Non-farm income	1.786 (0.410)	1.813 (0.391)	1.760 (0.428)	0.0532 (0.038)
Climate anomaly, summer	-1.247 (0.685)	-1.116 (0.801)	-1.377 (0.516)	0.261*** (0.063)
Climate anomaly, spring	0.165 (0.534)	0.256 (0.580)	0.076 (0.468)	0.180*** (0.049)

Field days effect on soil productivity (ITT)

Table 2: Field day conservation agriculture effects on land productivity for major cereal crops

	<u>2015 – 2016</u>		<u>2015 – 2017</u>		<u>2015 – 2019</u>		<u>2015 – 2021</u>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Field day	0.243*** (0.085)	0.255*** (0.090)	0.273*** (0.083)	0.310*** (0.089)	0.222*** (0.067)	0.245*** (0.068)	0.241*** (0.078)	0.295*** (0.084)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes
Number of observations	843	827	826	796	1255	1179	1160	876
R^2	0.6278	0.6404	0.6619	0.6738	0.6859	0.6925	0.6596	0.6651

- Controls included: HH size, Education, average age, Literacy, Income from non farm activities, land endowment, climate anomalies, oxen, donkeys, trees, relatives.

Preliminary Conclusions

- Sustainable practices deliver important production gain
- Cost saving technologies
- Providing detailed information about benefits of conservation ag
learn about sustainability and its economic benefits
- Multi year studies are needed

A lot to do

- Treatment on the treated analysis
- The role of technological innovation (improved seeds)
- Heterogeneous effects (but sample size issue)
- Future research on provision of detailed info (Extension, Phone?)

Grazie

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