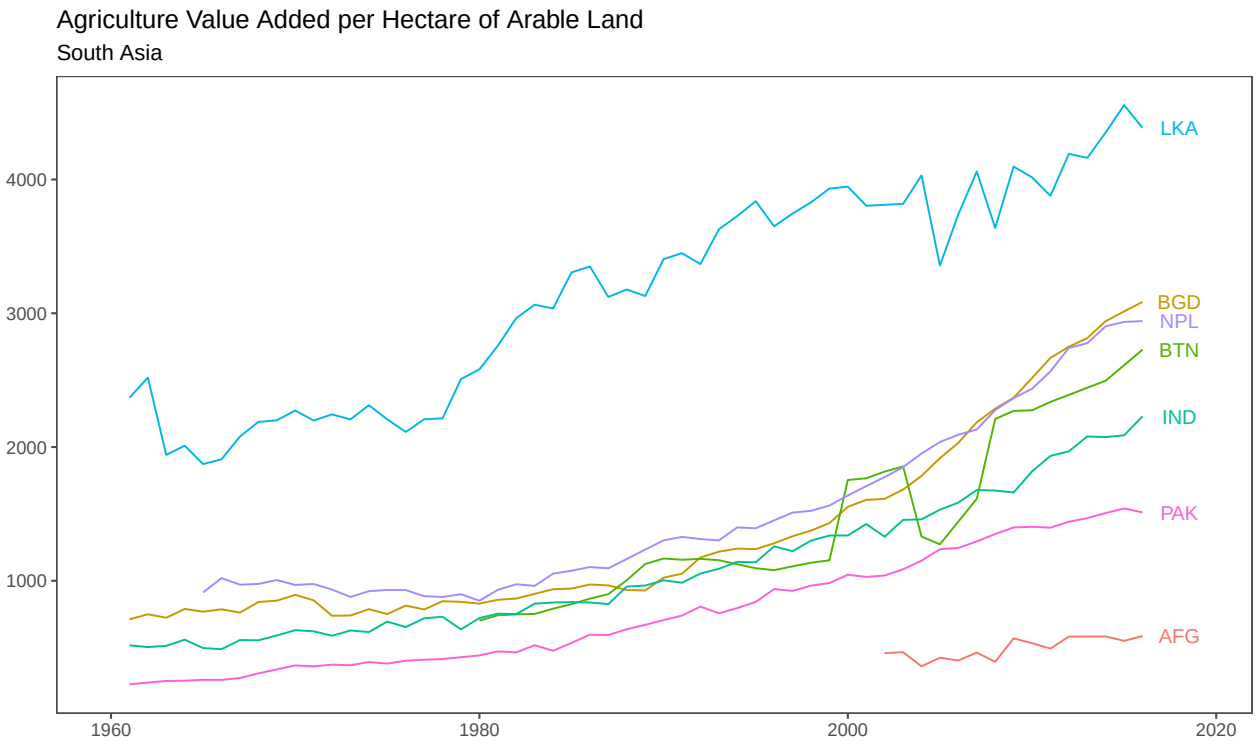
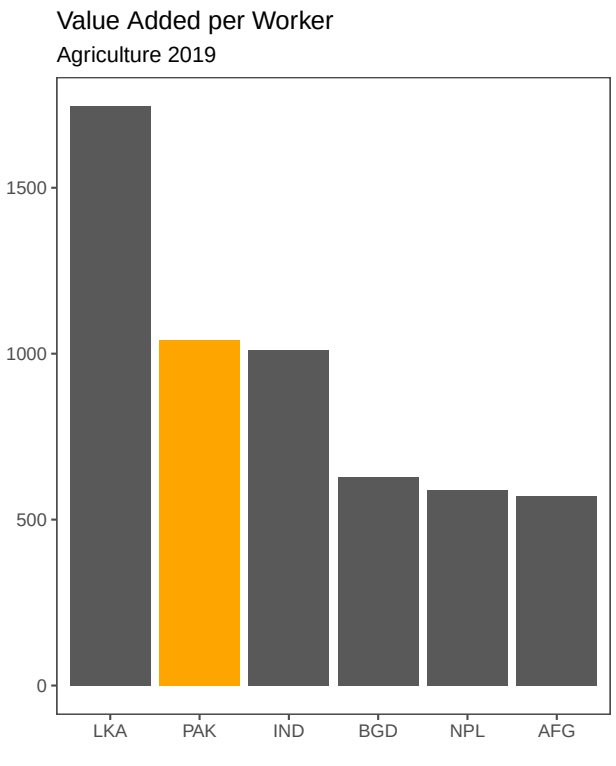
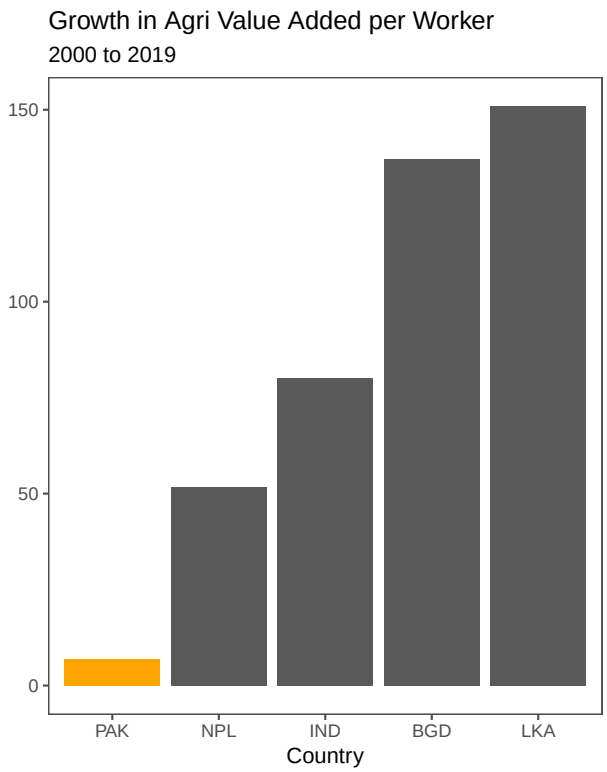
Agriculture in Pakistan

Pakistan produces less value added per hectare of Arable land than almost all of South Asia. This metric is also growing slowly. Growth in total value add has been the slowest in the region, and the amount of arable land has not changed. The growth rates in workers, across both male and female, is the highest in the region. Ultimately this results in the lowest value added per worker growth in the region as well.

We want Pakistan to produce more output per person. To achieve this, we are focusing on producing more food given the land that we have. What are the constraints to this, and can we identify what binds?

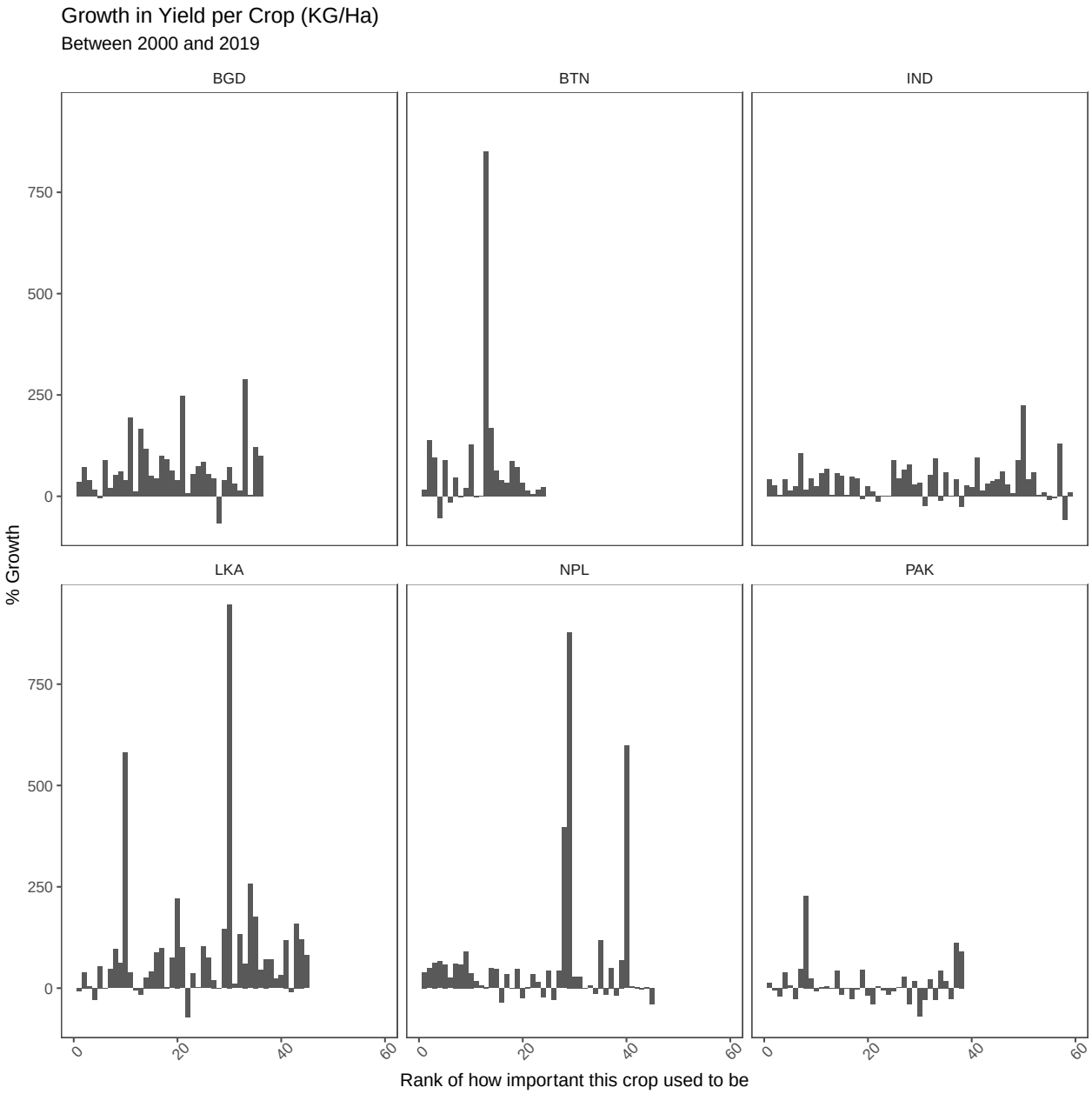




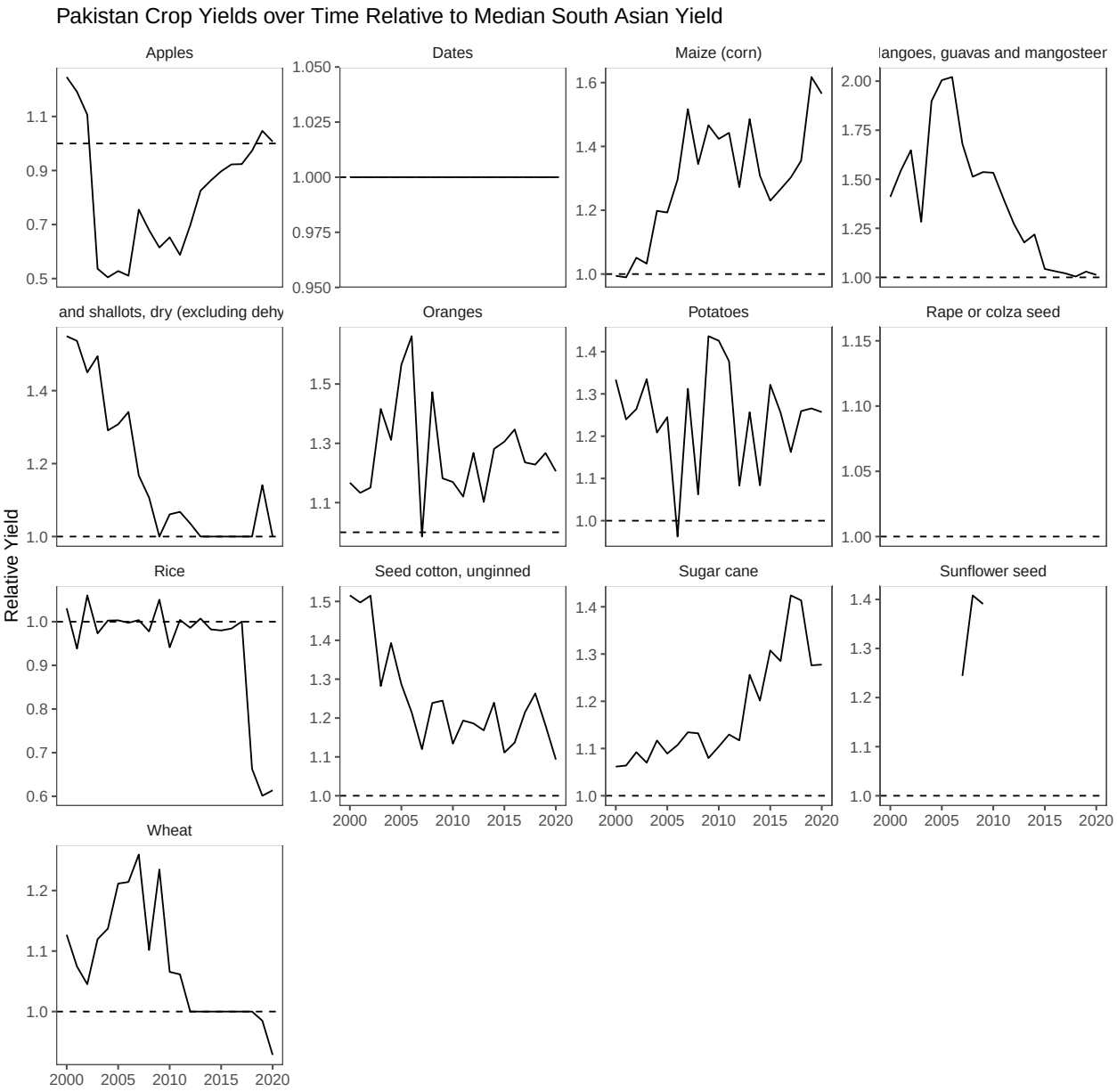


What is causing the low growth in value added? Is it because prices are not rising, or because yields are not rising? A basic check shows us that prices are not changing over time. Changes in growth are driven by changes in yields.

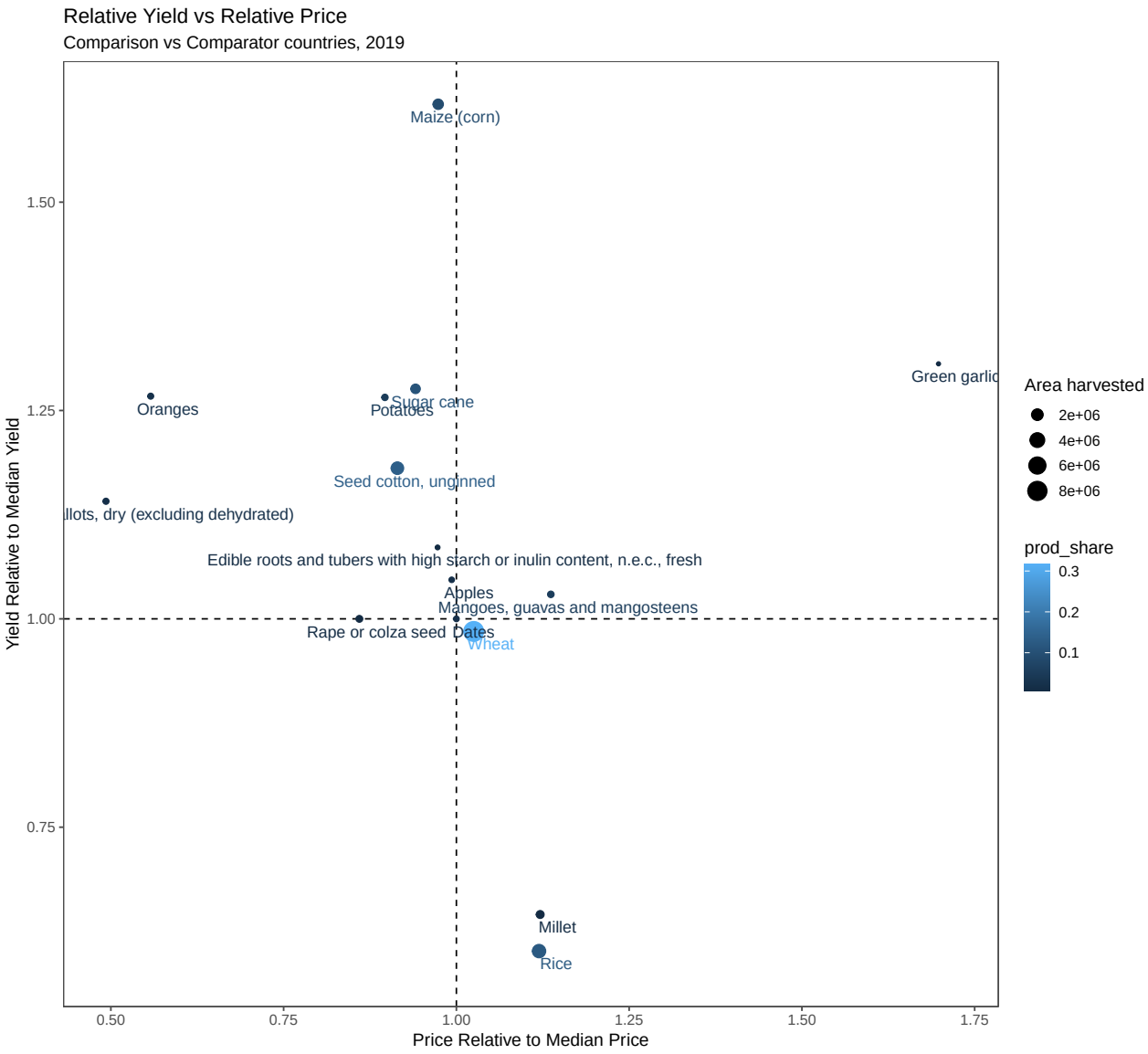
We compare the growth in yields for crops which are important to South Asian countries. This analysis shows us that yields in important crops have not improved in Pakistan.



Everything is driven by changes in relative yields. We can observe Pakistans competitiveness in its top crops against the median south asian performance. With few exceptions, we see relative yields declining from 2000 to 2020.



Important exceptions are corn and sugarcane. A look at the relative yields and relative prices tells us a bit more about the positioning of these crops, using price as a proxy for quality.



Pakistan has become increasingly uncompetitive in wheat, cotton and rice production, while it has increased its competitiveness in corn and sugarcane. Wheat and rice are of relatively higher quality than in the rest of south asia - using price as a proxy - while cotton, sugar and maize are less. There appears to be a tradeoff between higher yields and lower quality.

The analysis should then examine what has happened with these crops over time. Using farm-level data on Wheat and cotton, we can begin to get a picture.

Some takeaways, focusing on Wheat and Cotton.

- The more land allocated for the crop, the less the yield.
- Wheat responds to increased workers, while cotton does not.
- Cotton Yields respond to increased use of own seed. Wheat Yield decreases with increase of purchased seed
- Cotton yields appear to respond to increased usage of fertilizer, while Wheat does not.
- Use of land leveler on a larger proportion of land appears to decrease Cotton yields

- Use of harvester on a large proportion of land is associated with higher Wheat yields
- Use of Organic Manure is associated with lower cotton yields
- Use of micronutrients is associated with higher wheat yields
- Both Furrow and Bed and Furrow irrigation methods are associated with higher cotton yields compard to flooding.
- No noticeable distinction in yield for Wheat based on irrigation method
- Both cotton and wheat prefer Clay soil types
- Farmers ranking of soil fertility is positively correlated with higher yields
- Flat land is associated with higher wheat yields
- Access to canal water is associated with lower wheat and cotton yields
- Owning a tubewell is associated with higher wheat yields.
- Cotton yields are higher when land is not waterlogged
- Wheat yields are higher when there is no salinity
- Mildly eroded land is apparently associated with higher cotton yields
- Farmers appear to have a good sense of their soil quality

Table 1:

	Dependent variable:			
	yield			
	Wheat	Cotton	Rice	Corn
	(1)	(2)	(3)	(4)
land_worked_acre	0.00002 (0.0003)	−0.001* (0.0003)	0.001 (0.002)	−0.005 (0.112)
land_cultvd	−0.003*** (0.0004)	−0.001*** (0.0004)	−0.015** (0.007)	−0.388 (0.493)
fmly_wrkr_numb	0.043*** (0.013)	0.018 (0.013)	−0.104 (0.089)	−4.534 (3.717)
hired_wrkr_numb	0.011*** (0.002)	0.001 (0.002)	0.012 (0.011)	0.531 (0.527)
seed_acreB	−0.002 (0.002)	0.021*** (0.005)	−0.006 (0.013)	
seed_acreC	−0.004** (0.002)	−0.002 (0.005)	0.004 (0.005)	−0.848 (0.553)
kg_fert_acrea	0.001 (0.001)	0.003*** (0.001)	−0.007* (0.004)	−0.302 (0.200)
kg_fert_acreb	−0.0004 (0.0005)	0.003*** (0.0004)	−0.002 (0.002)	−0.051 (0.098)
kg_fert_acrec	0.0003 (0.001)	0.001 (0.001)	0.008** (0.004)	−0.057 (0.249)
rel_area_tractor	0.018 (0.085)	0.060 (0.058)	0.157 (2.798)	6.135 (52.303)
rel_area_landlevel	−0.066 (0.045)	−0.343*** (0.049)	0.170 (0.268)	−20.231 (13.922)
rel_area_harvester	0.396** (0.159)	0.370 (0.255)	0.385 (0.250)	−28.373 (34.801)
D_orgnc_mnreNo	0.030 (0.038)	0.093** (0.042)	−0.513** (0.233)	−7.879 (13.981)
D_micro_ntrntsNo	−0.172** (0.076)	−0.045 (0.072)	−0.326 (0.253)	0.201 (14.078)
irr_methdFurrow	0.177 (0.229)	0.246*** (0.044)	−0.429 (0.651)	−5.341 (13.874)
irr_methdBed and furrow	0.184 (0.126)	0.295*** (0.062)	0.030 (0.647)	−34.534* (18.144)
irr_methdOther (Specify)	−1.827 (1.130)			
soil_qualModerate	0.224*** (0.055)	0.231*** (0.063)	0.353 (0.497)	5.243 (17.036)
soil_qualLoam	0.249*** (0.068)	0.250*** (0.078)	0.276 (0.558)	−4.141 (19.054)
soil_qualClay loam	0.238*** (0.067)	0.350*** (0.077)	0.663 (0.516)	31.023 (21.291)
soil_qualClay	0.446*** (0.065)	0.452*** (0.074)	0.819 (0.533)	15.700 (19.935)
soil_qualOther (Specify)	0.049 (0.171)	0.250 (0.192)	−0.955 (0.989)	
soil_fert_rank	0.059*** (0.013)	0.075*** (0.014)	0.077 (0.076)	2.532 (4.352)
land_steep_typeSlight slope	−0.002 (0.061)	0.038 (0.067)	0.380 (0.406)	−24.432 (16.134)
land_steep_typeModerate slop	−0.227** (0.089)	−0.120 (0.092)	0.827 (0.711)	−30.521 (39.395)
land_steep_typeSteep Slope	0.196 (0.192)	0.056 (0.233)	−0.199 (1.465)	−16.714 (28.351)
access_canal_waterNo	0.172*** (0.041)	0.436*** (0.047)	0.400 (0.304)	27.397** (12.454)
access_tubewellDo not own a tubewell but have access to tubewell water	−0.139*** (0.039)	0.085* (0.044)	−0.034 (0.222)	8.366 (12.555)
access_tubewellNeither own nor have access to a tubewell water	−0.177* (0.105)	0.077 (0.106)	−0.761 (0.590)	
land_suffer_waterlogNo	−0.023 (0.062)	0.175** (0.075)	−0.117 (0.284)	−15.003 (37.360)
land_suffer_salinityNo	0.213*** (0.060)	0.107 (0.072)	−0.497* (0.295)	14.345 (37.960)
land_suffer_erosionMild Erosion	0.037 (0.045)	0.135*** (0.049)	0.356 (0.313)	−11.232 (15.041)
land_suffer_erosionSevere Erosion	−0.018 (0.114)	−0.089 (0.156)	−0.607 (0.710)	15.343 (37.494)
D_more_fert_qtyNo	0.116*** (0.039)	0.150*** (0.043)	−0.070 (0.218)	−5.356 (11.811)
soil_cmprd_othersSame	−0.229*** (0.064)	−0.277*** (0.069)	0.319 (0.373)	−15.569 (34.388)
soil_cmprd_othersWorse	−0.532*** (0.099)	−0.401*** (0.113)	0.128 (0.669)	−8.605 (39.587)
Constant	3.428*** (0.234)	0.520*** (0.181)	5.040* (2.873)	72.132 (77.538)
Observations	4,314	3,150	227	49
R^2	0.076	0.173	0.211	0.731
Adjusted R^2	0.068	0.164	0.067	0.193
Residual Std. Error	1.127 (df = 4277)	1.041 (df = 3114)	1.416 (df = 191)	26.010 (df = 16)
Note:				*p<0.1; **p<0.05; ***p<0.01

Figure 1: regression