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Gender and preference heterogeneity for Direct Seeded Rice with Drum Seeder:
A case study of Men and Women Farmers in Maharashtra, India

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Selected Poster prepared for presentation at the 2016 Agricultural & Applied Economics
Association Annual Meeting, Boston, MA, July 31- Aug. 2

Gender and preference heterogeneity for Direct Seeded Rice with Drum Seeder: A case study of Men and Women Farmers in Maharashtra, India



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BACKGROUND

HOW DSR (DRUM SEEDER) WORKS?:

In DSR, pre-germinated seeds are directly sown in a well puddled and levelled wet field using a drum seeder. Other kinds of seeders are also available.

Direct seeding removes the need for the back-breaking effort involved in transplanting

ADVANTAGES

Direct seeded rice (DSR) requires less labor and water and emits less greenhouse gases into the environment than the transplanted rice.

Yield also goes up with DSR

Limitations

DSR has higher weed growth than the transplanted rice. Farmers have to use labor for weeding or apply weedicides

METHODOLOGY

- We used discrete choice experiment (DCE) to analyse farmers' preferences for DSR.
- 36 efficient choice sets were generated and divided into 4 blocks randomly. We showed 9 cards to each farmers with 3 alternatives with status quo option (see choice set below).
- Used Random Parameter Logit (RPL) model as RPL accounts for unobserved, unconditional heterogeneity in preferences, unlike the conditional logit model.

MEN SHOWED LESS INTEREST THAN WOMEN IN DSR

	Model 1	Model 2
Male respondent	-0.2161*** (0.0150)	-0.1998*** (0.0190)
Constant	0.7747*** (0.0839)	1.0019*** (0.0884)
Card fixed effect	No	Yes
Household fixed effect	Yes	Yes
No. of Observation	5867	5867
Log lik.	-3236.9626	-2357.95
Adj-R2	0.1943	0.3991

FINDINGS

- Women are interested to pay more for the adoption of technology
- Age and education of the respondent, which represents experience, do not effect adoption behaviour.
- Respondents who were considering using drum Seeder in near future aware about the minimum support price and who worked more than 10.5 hours in a day are willing to pay additional money for the adoption of technology.
- Access to credit, input as well as output market, migrate for off-farm employment opportunities comes out as a positive correlation with adoption and WTR for DSR drum Seeder.

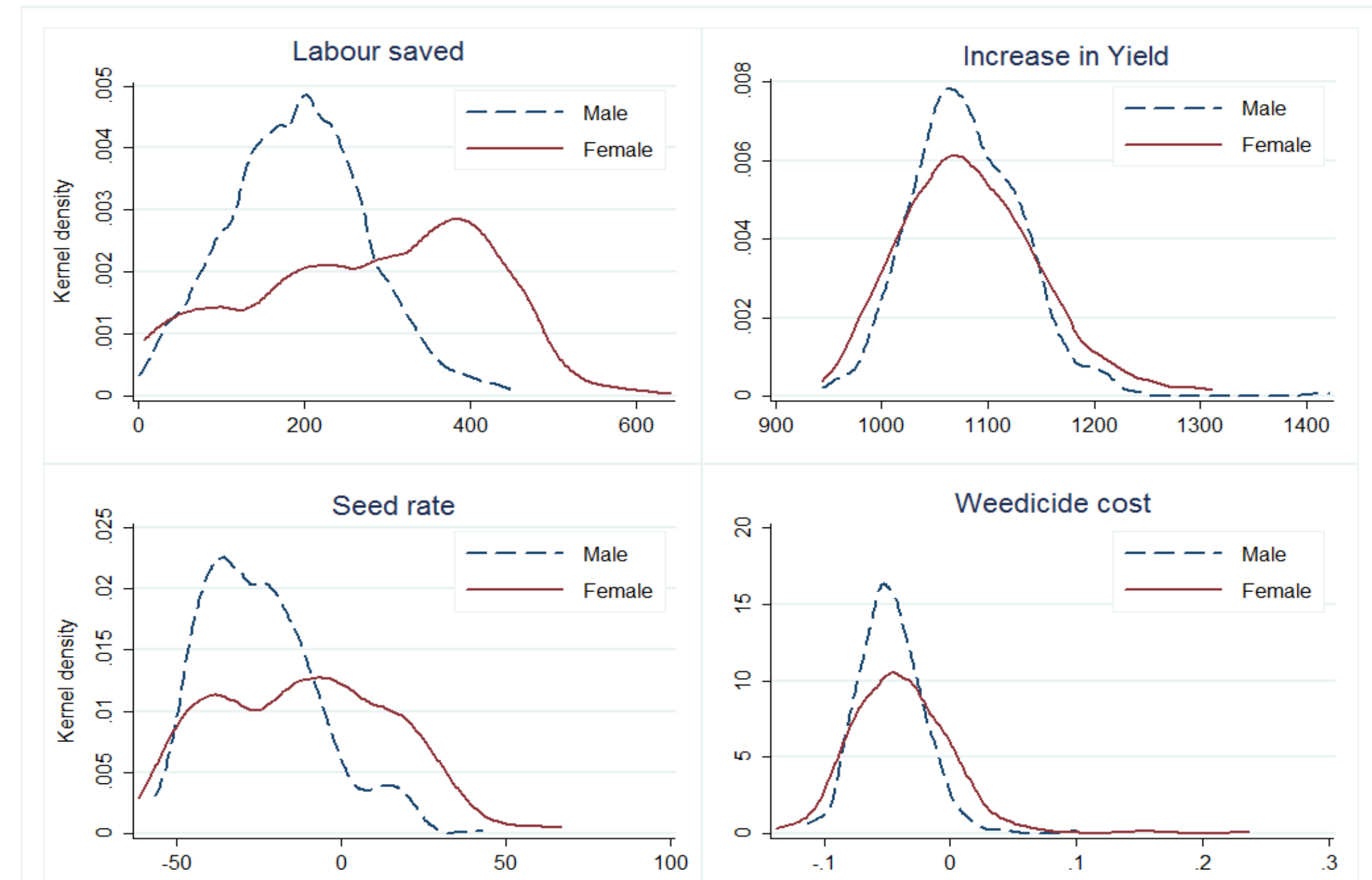
OBJECTIVES

- To understand the preference heterogeneity between men and women for Direct Seeded Rice (DSR) Drum-seeder.
- To find out the factors that explain farmers technology adoption behaviour.
- To measure the willingness to pay for direct seeded rice (Drum Seeder) for both men and women.

PRIMILINARY RESULTS: RPL MODEL

	Pooled	Male	Female
RANDOM MARGINAL UTILITY PARAMETERS			
SEED RATE (KGS)	-0.01567** (0.00641)	-0.01906** (0.00803)	-0.01482 (0.0103)
LABOUR SAVED (MANDAYS)	0.20763*** (0.01716)	0.14591*** (0.02251)	0.2896*** (0.02433)
YIELD INCREMENT (QUINTALS)	0.95118*** (0.06642)	1.30505*** (0.10559)	0.68066*** (0.08177)
WEEDICIDE COST (INR)	-0.00004 (0.00012)	-0.00015 (0.00022)	-0.00007 (0.00016)
NON-RANDOM MARGINAL UTILITY PARAMETER			
PRICE OF DSR (INR)	-0.00088*** (0.00004)	-0.00093*** (0.00005)	0.00086*** (0.00005)
DISTRIBUTION PARAMETERS			
STD. DEVIATION (SEED RATE)	0.04658*** (0.00838)	0.027997* (0.01645)	0.07928*** (0.01028)
STD. DEVIATION (LABOUR SAVED)	0.13533*** (0.00838)	0.07062** (0.01208)	0.13779*** (0.01282)
STD. DEVIATION (YIELD INCREMENT)	0.20774* (0.10978)	-0.01035 (0.01179)	0.54613*** (0.11268)
STD. DEVIATION (WEEDICIDE COST)	0.00018 (0.00018)	0.00008 (0.00011)	0.00037** (0.00017)
LOG-LIKELIHOOD	-4213.1788	-1788.1942	-2319.042

INDIVIDUAL-LEVEL MARGINAL WILLINGNESS TO PAY (INR) FOR DSR ATTRIBUTES



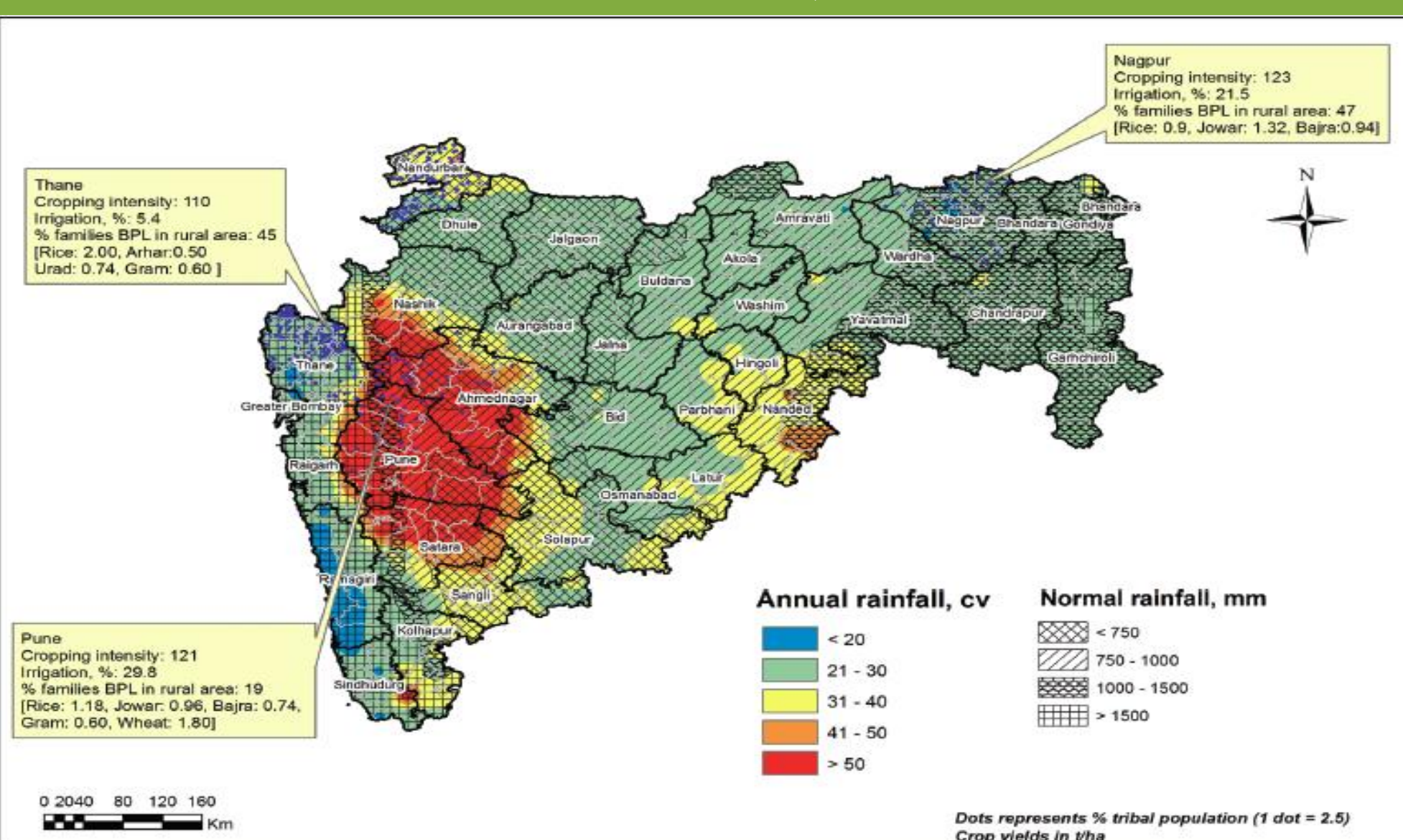
WILLINGNESS TO PAY (RPL MODEL) FOR DSR-DRUM SEEDER ATTRIBUTES: PRIMARY SOURCE OF INCOME IS CULTIVATION

	Mean	Lower	Upper
Pooled			
Seed Rate (Kgs)	-35.619	-58.841	-14.654
Labour saved (mandays)	271.653	231.893	309.102
Yield Increment (quintals)	1138.089	980.058	1304.448
Weedicide cost (INR)	-0.095	-0.415	0.224
Male			
Seed Rate (Kgs)	-27.009	-49.916	-6.080
Labour saved (mandays)	154.907	104.825	198.197
Yield Increment (quintals)	1607.035	1405.528	1843.066
Weedicide cost (INR)	-0.286	-0.873	0.350
Female			
Seed Rate (Kgs)	-36.031	-80.624	0.216
Labour saved (mandays)	414.947	368.553	467.638
Yield Increment (quintals)	725.100	484.126	981.965
Weedicide cost (INR)	-0.192	-0.597	0.218

SAMPLE DATA STRATEGY

- 2 districts (Thane and Palghar) in Maharashtra
- 6 rice growing blocks from 2 district, four from Palghar (Palghar, Jawhar, Mokhada and Wada) and two from Thane (Shahapur and Morbad)
- 6 villages randomly selected from each block.
- Focus group discussion with more than 240 farmers in 40 groups to elicit preference for various climate smart agricultural technologies using Likert scale.
- Farmers showed greatest interest in DSR.
- 5 villages randomly selected from each block covering 30 villages
- Our sample consists of 666 respondents (329 men and 337 women) farmers from 400 households.
 - 266 households (both men and women)
 - 134 households (63 male and 71 female separately)

STUDY LOCATION: THANE, MAHARASHTRA

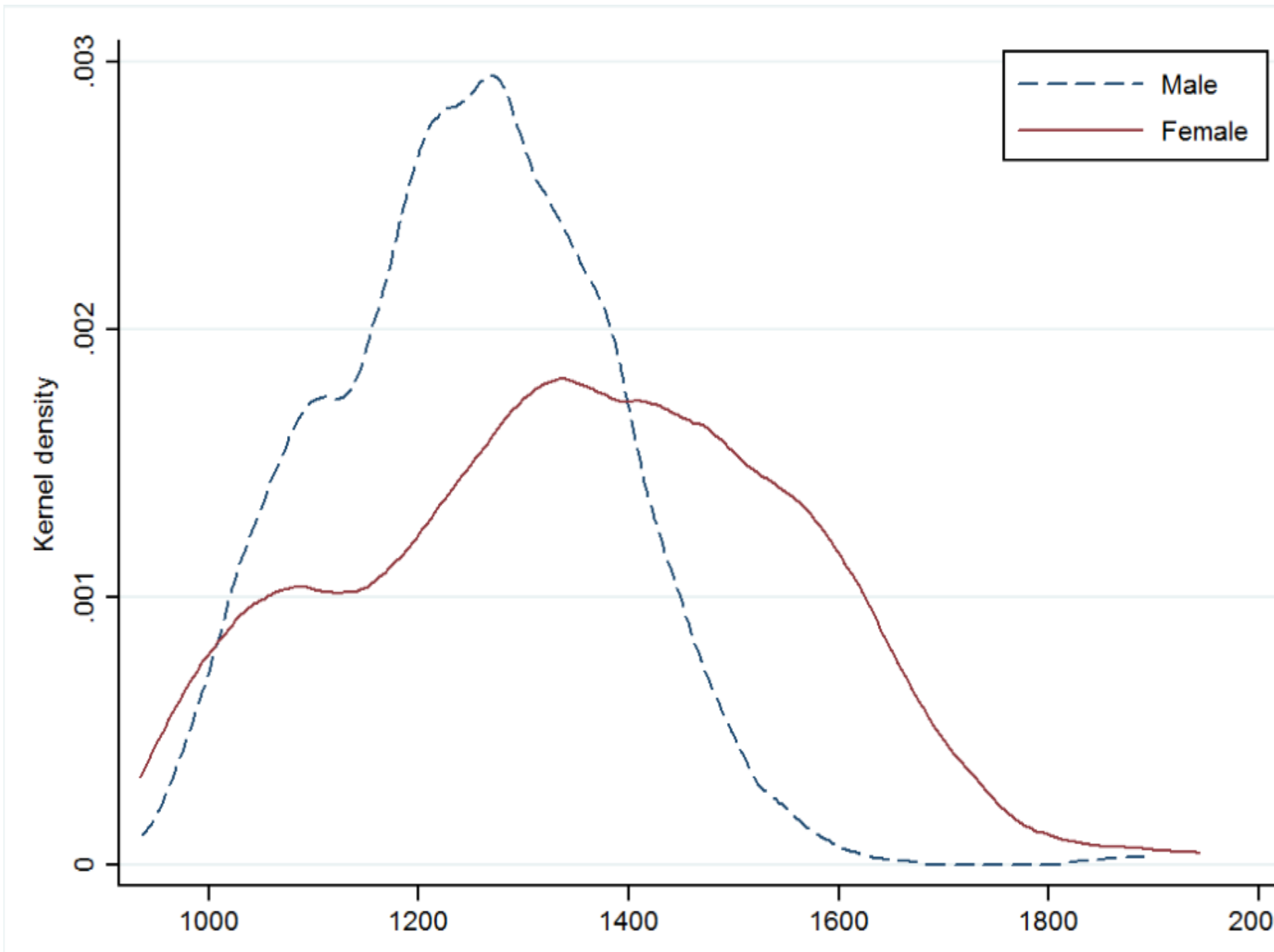


WILLINGNESS TO PAY FOR DSR-DRUM SEEDER ATTRIBUTES

	Mean	Lower	Upper
Pooled			
Seed Rate (Kgs)	-17.814	-33.362	-3.783
Labour saved (person-days)	236.038	206.331	263.264
Yield Increment (quintals)	1081.309	956.007	1214.126
Weedicide cost (INR)	-0.042	-0.297	0.221
Male			
Seed Rate (Kgs)	-20.561	-39.547	-2.979
Labour saved (person-days)	157.416	117.343	192.796
Yield Increment (quintals)	1408.008	1235.180	1591.233
Weedicide cost (INR)	-0.164	-0.615	0.321
Female			
Seed Rate (Kgs)	-17.175	-43.509	5.336
Labour saved (mandays)	335.648	296.278	376.291
Yield Increment (quintals)	788.898	622.398	968.119
Weedicide cost (INR)	-0.084	-0.421	0.252

Note: Confidence interval derived using bootstrap procedure introduced by Krinsky and Robb (1986) based on 1000 random draws

INDIVIDUAL-LEVEL TOTAL WILLINGNESS TO PAY (INR)



T-TEST RESULTS OF DIFFERENCE BETWEEN MALE AND FEMALE MWTP FOR DSR-DRUM SEEDER ATTRIBUTES

	Male	Female	Diff.	T-test of sig. diff. in means
Seed Rate (Kgs)	-24.37	-11.47	-12.90	7.32***
Labour saved (mandays)	193.12	278.17	-85.05	9.67***
Yield Increment (quintals)	1079.70	1084.30	-4.60	0.98
Weedicide cost (INR)	-0.05	-0.04	0.04	3.23***

CONCLUSION

- Men have a higher willingness to pay for attributes that increase income (income in yield) and or reduce cash costs (reduction in the seed-rate)
- Women value more for reduction in labor requirement (and possibly accompanying drudgery) more than the men.
- Women have a significantly lower say than the men in household decisions related to agriculture like choices of crops, inputs to buy and adoption and purchase of new technologies and equipments and their families.
- Extension for promotion of DSR- drum-seeder is likely to be more successful if it also targets women farmers and highlight the attributes of the technology that is of greater interest to them.
- Comparing the average WTP for a drum-seeder with its market price suggests that a capital subsidy is needed to promote its adoption by farmers in our study area.

WHAT DETERMINES THE WTP FOR DRUM SEEDER: PROBIT RESULT

- Women are interested to pay more for the adoption of technology.
- Age and education of the respondent do not affect adoption behaviour.
- Respondents who are planning to use DSR drum seeder in near future, aware about the minimum support price and who worked more than 10.5 hours in a day are willing to pay more for drum-seeders.
- Access to credit, input as well as output market, migrate for off-farm employment opportunities comes out as a positive correlation with adoption and WTP for DSR drum-seeder

ACKNOWLEDGEMENTS

- Patrick ward and Devesh Roy from IFPRI, Paresh Srisath from IWMI CCFAS and Julian Sagbiel from Humboldt University for their valuable suggestion.
- Bhushana Karandikar, Manoj Kumar and State and District level government officers in helping in conducting FGDs and Survey..
- Financial support from the CCAFS.