Farmer Field Days and Demonstrator Selection for Increasing Technology Adoption

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Abstract

Inadequate learning is an oft-cited friction impeding the adoption of improved agricultural technology in the developing world. We provide experimental evidence that farmer field days — an approach used throughout the world where farmers meet, learn about new technology, and observe its performance — alleviate learning frictions and increase adoption of an improved seed by 40 percent. Further analysis demonstrates that these field days are both cost effective and more impactful for poorer farmers. In contrast, we find no evidence that selecting the first adopters of new technology via participatory village meetings has any effect on future adoption.

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1 Introduction

Technology is an important engine of growth for smallholder farmers in developing countries. Yet, adoption levels often remain below expectation, with slow learning serving as one of the common explanations (Jack, 2011). Agricultural extension is the most common technique in developing countries for transferring technological information from scientists directly to farmers. Optimizing extension services requires building a better understanding of the effectiveness of different methods for spreading and aggregating information. Recent work has considered the potential of sharing advice via mobile phones (Aker, 2011; Fafchamps and Minten, 2012; Cole and Fernando, 2018), improving the selection of the "seed farmers" chosen as the first users of technology (Beaman et al., 2018), or compensating these initial seed farmers based on future adoption in the community (BenYishay and Mobarak, 2018).

We offer experimental evidence on a different approach known as the "farmer field day" where a new technology is first introduced and tested by a group of "seed farmers", and then an NGO or extension worker engages neighboring farmers in a meeting where the attributes of the technology are discussed, and its' performance is observed in the field. The field day creates an opportunity for farmers to share information, observe performance, and deliberate on technological attributes. This approach contrasts with relying only on informal communication between farmers in networks. Despite this technique being common, we have limited knowledge on its effectiveness.[1]

We also investigate whether the effectiveness of field days depends on how seed farmers (which we refer to as demonstrators) are selected. Peers serve as credible sources of information about agricultural technology (Foster and Rosenzweig, 1995; Bandiera and Rasul, 2006; Conley and Udry, 2010; Krishnan and Patnam, 2014). Building on this, recent literature focuses on how to optimally select demonstrators. The methods considered range from

[1] The field day is commonly part of the "Farmer Field School" approach where the first users of the technology also receive frequent trainings on the technology throughout the season. The field day — where other farmers are invited to observe the experimentation — happens at the end of the season. We focus only on the field day as a way to decrease the cost of the intervention and thus increase scalability.

selecting lead farmers, more representative peer farmers, or eliciting the full social network and selecting the theoretically-optimal demonstrators (Kondylis, Mueller, and Zhu, 2017; BenYishay and Mobarak, 2018; Beaman et al., 2018).

We test whether selecting demonstrators via village meetings improves learning and increases adoption. We consider this approach for three reasons. First, selection by village participation — in contrast to selection by local village politicians — has the potential to increase adoption by generating a more representative pool of demonstrators, which can improve social learning by making it easier for farmers to extrapolate the outcomes of demonstrators to their own situations (Conley and Udry, 2010; BenYishay and Mobarak, 2018). Second, the low cost of meetings makes them a policy-relevant alternative. Third, if villagers know the best people to diffuse information, as in Banerjee et al. (2019), then village meetings may be a simple way of getting them to combine this information.

In the first arm of our experiment we introduced 25 kilograms of a new high-yielding and flood-tolerant rice variety called Swarna-Sub1 in 100 villages in Odisha India. Importantly, the technology dominates existing technology, indicating that it should diffuse rapidly in the absence of barriers to adoption.[2] The farmers receiving seeds, i.e. the demonstrators, were chosen using one of three methods. In one third of the villages we used the status-quo approach of delivering the seeds to locally-elected village officials — ward members in the Gram Panchayat — who then chose how to further distribute the seeds amongst villagers.[3] In another third of the villages we used a participatory meeting where villagers were invited to jointly determine how the seeds should be allocated. Finally, we used village meetings with local women's groups (Self Help Groups or SHG's) in the remaining villages.

In the second arm of the experiment our partner NGO carried out the farmer field days in 50 villages. These field days occurred approximately four months after the seeds were

[2]The variety was released in 2009. It offers flood tolerance without reducing yield during non-flood years (Dar et al., 2013). The technology also leads to significant welfare gains by inducing farmers to modernize production (Emerick et al., 2016).

[3]The method of delivering a small amount of seeds for testing and knowledge creation is a popular approach in South Asia. India's National Food Security Mission (NFSM) program uses these seed minikits and relies on members of the Gram Panchayat to help identify beneficiaries.

introduced and while the crops of the demonstrators were nearly mature. The field days were simple two-hour events where the NGO gave information on the new variety, demonstrators spoke about their experience, questions were answered, and then attendees were taken to observe the crops in the field.

We then measured demand directly by offering the new variety for sale after harvest and immediately prior to planting for the next growing season. The sales teams went door-to-door and asked a random sample of 15 households per village whether they were interested in buying seeds. Importantly, we fixed the price to be near the prevailing market price.[4] Door-to-door sales have two main advantages. First, they reveal demand at the market price in the absence of any barriers on the supply side. Second, self-reported information on seed variety adoption is known to contain significant measurement error (Macours, 2019). Directly revealing behavior, rather than relying on self reports, minimizes this error.

The experiment delivers three main results. First, the field days lead to an economically significant increase in uptake. In particular, field days caused uptake to increase by 12 percentage points, or from 30 to 42 percent of farmers. This effect is larger for adoption of a single seed package: purchases of one five kilogram packet rose by 59 percent, while purchases of at least two packages rose by only 25 percent.[5] Importantly for policy, this technique is cost effective. Field days deliver a return on investment after just a single season of about 1.14. Moreover, the effect of field days on demand is the largest for poor and historically disadvantaged farmers. More specifically, the treatment effect is significantly larger for farmers that are in lower caste groups and farmers that are below the poverty line (BPL), as defined by the government's anti-poverty program.

Second, despite reducing favoritism by elected officials, selecting demonstrators via meetings had no impact on adoption. Differences in adoption between ward member, SHG meet-

[4]The new variety was not yet available at the government offices where most farmers purchase subsidized seeds. One company in the area was selling seeds of this variety at a price higher than the subsidized price. We refer to this as the prevailing market price.

[5]97 percent of farmers that purchased seeds bought only one or two packages. This amount of seeds is enough to cultivate around 10-40 percent of their land.

ing, and village meeting villages are small and statistically insignificant. In general, we can rule out large effect sizes comparable to those of the field days. This null effect exists despite the fact that meetings alter the pool of demonstrators. Elected officials tend to favor their close friends when selecting demonstrators. This favoritism disappears when selection takes place during meetings. More concretely, the demonstrators are 31 percent and 62 percent less likely to be close family or friends of the ward member in village meeting and SHG meeting villages, respectively.

Third, the effect of field days is no larger when demonstrators are selected by meetings. If anything, the effect is largest when demonstrators are selected by locally elected officials. However, the differences in treatment effects across the three methods of identifying demonstrators are not statistically significant. Nonetheless, we can rule out large and positive interaction effects between that field days and village participation in selecting demonstrators. We interpret these findings as evidence that the field days enhance learning and increase adoption, regardless of the identities of the demonstrators.

We close by presenting suggestive analysis to investigate some possible mechanisms for the field days. The data suggest that field days do more than inform farmers about the existence of the new technology. Most farmers in the control group are aware of Swarna-Sub1. Moreover, the field days have an impact for the demonstrators, who were clearly already aware of the technology. We also show that the field days did not seem to be more effective in villages with more demonstrators, or when they were attended by more demonstrators. We conclude from these findings that the effectiveness of field days may not result from greater communication between demonstrators and farmers. This leaves potential alternative explanations, such as that farmers benefit from hearing from an outside NGO or other farmers.

We contribute by providing some of the first experimental evidence on field days as a technique for encouraging technology adoption. Field days are commonly used throughout the world. They are a standard element of the "farmer field school" approach where multiple trainings are carried out over a season and the field day takes place at the end to explain the demonstration and share information to a wider set of farmers. This approach to agricultural extension has been implemented in at least 90 countries, yet rigorous evidence on its effectiveness remains scarce.[6] Two recent experimental studies find little evidence that field days lead to cost effective gains in adoption. Maertens, Michelson, and Nourani (2017) find that field days had no effect on learning and adoption of techniques to improve soil fertility in Malawi. Relatedly, Fabregas et al. (2017) find in Kenya that field days had large (but insignificant) effects on adoption of soil amendments and were not cost effective. The field days that we study differ from these two papers. First, the field days in our experiment had a narrowly focused message on a particular new seed variety. This may be easier to learn about in a field day compared with a complex bundle of practices or a new input with very heterogeneous returns. Second, these field days were smaller (carried out at the village level) and less costly.[7]

We also add to a literature that investigates policy-relevant mechanisms for improving the selection of demonstrators. These mechanisms aim to identify the optimal entry points for diffusion of information between agents in a social network. As one example, Beaman et al. (2018) find that theory-based methods of selection outperform selection by Malawian extension agents. Specifically, their model-based treatments cause increases in adoption of an improved planting technique by around 3 to 4 percentage points. The costliness of collecting network data makes that particular treatment difficult to implement, but suggests the need to find more scalable — but no less effective — alternatives to identifying contact farmers. Participatory meetings with villagers seem like a desirable alternative because they are inexpensive and villagers may have private information on the people best positioned

[6]Waddington, White, and Anderson (2014) provide a comprehensive review of the literature on farmer field schools. They found no randomized evaluations of field schools. The vast non-experimental literature tends to find that field schools increase adoption and improve outcomes of participants, but result in little diffusion to others (Godtland et al., 2004; Feder, Murgai, and Quizon, 2004; Ricker-Gilbert et al., 2008; Davis et al., 2012; Larsen and Lilleør, 2014; Waddington, White, and Anderson, 2014).

[7]Fabregas et al. (2017) report cost estimates of around $9 to $26 per attendee. The field days in our experiment cost about $5.58 per attendee.

for information diffusion (Banerjee et al., 2019). We find no evidence that this selection mechanism drives adoption. Instead, farmers gain additional useful information from meeting to discuss a new technology.

The rest of this paper is organized as follows. Section 2 provides background on the Swarna-Sub1 technology and discusses the experimental design. Section 3 discusses the conceptual motivation for this experimental design. Section 4 gives results, while Section 5 offers concluding remarks.

2 Background and experimental design

This section provides details on the technology introduced to farmers, emphasizing how its properties make it a suitable technology for studying diffusion. We then give specific details on the experimental design.

2.1 Swarna-Sub1 Technology Introduction

Swarna-Sub1, a rice variety released in India in 2009, offers flood tolerance as its unique benefit. Swarna-Sub1 remains otherwise similar to Swarna, which is a popular type of rice cultivated throughout eastern India and Bangladesh. The technology was developed by moving a group of flood tolerance genes from a traditional rice seed into Swarna.[8] Plant breeders were able to rely on modern breeding techniques to create the improved variety without introducing other undesirable characteristics, such as lower yield during normal years or inferior eating quality (Xu et al., 2006). This is important because it guarantees that the technology offers an added benefit — but otherwise remains similar to a well known seed variety.

Previous work has conferred two channels through which this new variety improves wel-

[8]The biological mechanism is that Swarna-Sub1 suppresses the plant's natural response of elongation during flooding. This allows the plant to retain the necessary carbohydrates for regeneration after the flooding is over (Voesenek and Bailey-Serres, 2009).

fare. First, the technology increases output under flooding without lowering it during normal years (Dar et al., 2013). Second, Swarna-Sub1 induces farmers to invest more in inputs, particularly at or near the time of planting — likely due to the reduction in risk faced by farmers (Emerick et al., 2016). Thus, adoption can induce welfare gains even absent flooding.

This innovation offers a unique opportunity to study diffusion because it dominates an existing and common seed. At the same time, there are few differences between Swarna and Swarna-Sub1, other than flood tolerance. This simplifies learning because the innovation offers value without requiring farmers to learn about other new inputs or management techniques. This suggests that the technology should diffuse rapidly in a frictionless environment. We focus on learning frictions and show them to be one potentially important barrier to adoption.

2.2 Details of the experimental design

The experiment took place in 100 villages in Balasore — a district in the northeastern corner of the state of Odisha, India.[9] The villages are located in three blocks — an administrative unit two levels above villages. We randomly selected these villages from the subset of villages that were affected by flooding for at least 2 days in 2011 or 2013, as measured from satellite images. The sample focuses on flood-prone areas to ensure that adoption is a profitable outcome.

We next describe the timing of events, which we also display graphically in Figure 1. We first administered a baseline survey to 10 farmers in each village.[10] A local village leader identified these farmers for our survey teams. The baseline aimed to measure whether farmers in the sample villages had any past experience with Swarna-Sub1. Past experiences were indeed limited: only two farmers that were surveyed had cultivated Swarna-Sub1 during the previous season. In contrast, 74 percent of farmers were cultivating Swarna, the variety that is otherwise similar except for flood tolerance. This makes the technology ideal for the

[9] See Figure A1 for a map of the study area and villages.

[10] Enumerators were unable to carry out the baseline survey in one of the 100 villages.

experiment because it is profitable relative to the most popular variety, but unknown to farmers, making learning about its benefits an important consideration.

Shortly after completion of the baseline in May 2014, enumerators returned to all villages, regardless of treatment status, to distribute seeds to demonstrators. Each village was provided with 25 kilograms — an amount that is sufficient to cultivate one or two acres. More importantly, the seeds were already packaged into five kilogram packages to encourage that at least five farmers be selected as demonstrators.

Villages were randomly assigned to one of three methods for identifying demonstrators. First, the seeds were delivered to the locally elected village ward member in 33 villages. The ward member is elected to represent the village in the local Gram Panchayat, or the next administrative unit above villages. A representative from our partner NGO delivered the seeds directly to the ward member and informed them that the NGO was giving the seeds to the village. The enumerator then instructed the ward member to pick demonstrators so that after a year a lot of farmers will be able to grow Swarna-Sub1 in the village. This guidance encourages the ward member to select demonstrators with village-level adoption in mind. The seeds were then left to the ward member and she independently decided about their further distribution, including whether to keep some for herself. This approach simulates the common approach of both government and NGO's of using local political figures to distribute seed minikits, as in Bardhan and Mookherjee (2006, 2011).

Second, in 34 meeting villages NGO staff first visited the village and informed as many villagers as possible that they were carrying out a short meeting to describe a new flood-tolerant rice variety. Enumerators were specifically instructed to put the seed minikits at the front of the meeting and describe the benefits of the new variety relative to Swarna. Importantly, enumerators instructed villagers to jointly decide on demonstrators — again with the idea of maximizing future adoption at the village level. In all cases villagers were able to come to an agreement and all 25 kilograms of seed were distributed to farmers that were willing to plant.

Third, we used a process that was nearly identical to the meetings in the remaining 33 villages — the only difference being that only Self Help Group (SHG) members were invited to the meeting. This approach makes the meeting inclusive of entirely women.

Enumerators returned to all villages in September 2014 to survey the demonstrators. This short survey had two purposes. First, it allows us to compare characteristics of demonstrators across treatment arms. Second, we collected information on how much area was planted with Swarna-Sub1, the current status of the crop, and the GPS boundaries for the plots of farmers that actually transplanted the seedlings. Overall, we have plot locations for 452 (67 percent) of the farmers that received seeds.

Farmer field days were then carried out in 50 randomly selected villages during the month of November 2014. The field days were purposefully timed to take place slightly before harvest when the demonstrators had built some experience with the technology but while the crop was still in the ground for demonstration.[11] The field days were short. The protocol included a period at the beginning where the NGO introduced farmers to Swarna-Sub1, its main flood-tolerance benefit, and its similarities with Swarna. Farmers were then shown pictures of "head-to-head" comparisons between Swarna and Swarna-Sub1 after flooding. The NGO facilitator then gave farmers some brief information about management practices, including the time of planting, seeding rate, fertilizer requirements, and pest control. After this, the facilitator explained practices that can be taken to ensure proper seed quality. These practices are not specific to Swarna-Sub1, but relevant for any type of rice variety. The demonstrators were then given an opportunity to share their experience with Swarna-Sub1. Other than this, the field days were led by the NGO facilitator. Finally, when possible, farmers were taken to a Swarna-Sub1 plot to observe performance.[12] The field days took about two hours.

The field days were attended by, on average, 41 farmers. This amounts to around 59

[11]Demonstrators did not know the field days would eventually take place when they were provided seeds.

[12]Farmers were not able to see plots if none of the demonstrators growing Swarna-Sub1 attended the field day. This happened for 29 percent of the time.

percent of rice-farming households in the village. Table A1 shows that household characteristics do not strongly predict attendance. The field days appear to have been attended by a broad group of villagers and not just the wealthiest or most elite farmers. In addition, we find no evidence that the types of farmers attending varied across the three methods for selecting demonstrators. In other words, farmers do not appear to be attracted to the field days based on their similarities with demonstrators.[13]

We then carried out a survey with approximately 15 farmers in each village in order to measure knowledge about Swarna-Sub1. We refer to this group as the non-adopting farmers, i.e. those that were not in the group of demonstrators. The surveys took place during February to March 2015. We used the list of households from the 2002 Below the Poverty Line (BPL) census to randomly select households.[14] We removed the demonstrators before randomly selecting the households. Each respondent was asked several questions to measure their knowledge of Swarna-Sub1. These included whether they knew about it at all, knowledge of its main benefit, which areas are suitable for cultivation, and duration (time from planting to harvest).

Our field partner sent a new team of staff members to each village in May 2015. Each farmer that was surveyed in February-March was visited and given the opportunity to purchase Swarna-Sub1 seeds. There was only one other NGO selling Swarna-Sub1 to farmers for a price of 20 rupees per kilogram. Our price was set to 20 rupees in order to mimic this market price. Thus, farmers benefitted mostly from free delivery when given this purchasing opportunity. Most of the farmers in our sample did not know how to obtain Swarna-Sub1.[15]

We observed a strong demand for the technology in the door-to-door sales: 36 percent of farmers bought at least one package of seeds. Government seed dealers sold Swarna for a

[13]This could be because the NGO was responsible for inviting farmers to the field days or that farmers chose not to selectively attend based on the identities of the demonstrators.

[14]We selected all households in the villages where there were fewer than 15 non-adopting households.

[15]One of the main questions that came up during the field days was how to obtain the seed. Private seed companies did not operate in this area at the time and the seeds were usually not available at the local block office where most farmers buy their seeds. There was only one other NGO with access to seeds and most farmers were unaware of this NGO.

price of 14.5 rupees during the 2014 season. In Emerick et al. (2016), we estimate the profit advantage of Swarna-Sub1 to be around 1,800 rupees per hectare. Swarna-Sub1 is therefore still profitable with a price difference of 5.5 rupees per kilogram and an estimated seeding rate of 50 kilograms per hectare.[16]

The inability to record adoption from other sources — largely other farmers in the village — is the disadvantage of measuring demand with the door-to-door sales. Swarna-Sub1 is an inbred rice variety that can be multiplied, reused, and traded with other farmers. Many estimates indicate that this informal seed system of either reusing one's own seed or obtaining from neighbors accounts for a meaningful portion of seed supply in South Asia.

We remedied this issue by carrying out a door-to-door adoption census starting in July 2015. Survey teams went door-to-door in each village and asked each rice farming household a small set of questions, including whether they were currently cultivating Swarna-Sub1. A total of 6,511 households were surveyed. This additional dataset allows for measurement of adoption for the same agricultural season as the door-to-door sales, but from all possible sources — not just from the door-to-door sales. The data show the importance of supply barriers. Only 14 percent of all households adopted Swarna-Sub1.[17] This compares to a 36 percent adoption rate in the door-to-door sales sample.

Table A2 shows summary statistics for the sample of 15 farmers per village that we use in the analysis. The table also considers covariate balance by regressing each characteristic on the field day indicator and block fixed effects. Differences in means between the field day and control villages are generally small and statistically insignificant. Table A3 further verifies that household characteristics vary little across the three different methods of choosing demonstrators. Part of the reason we introduced only 25 kilograms was to make the pool of demonstrators a small share of the village. More concretely, around 6 to 8 farmers — or 10 percent of the rice-farming population — were selected as demonstrators in most villages.

[16] This seeding rate is larger than the agronomic recommendation, but more in line with what we observe in surveys.

[17] This figure includes the demonstrators from the previous year.

Thus, the sample of non-demonstrating farmers represents most of the village. We also show adoption effects for the entire village — including demonstrators, which eliminates the possibility that any type of selection into the estimation sample affects any of the estimates.

3 Conceptual motivation

Before turning to results, we briefly discuss the conceptual motivation of these interventions. Our experiment tests alternative ways to increase technology adoption. We consider alternative policy mechanisms to encourage learning. More specifically, interventions that can either spread additional awareness, give farmers an opportunity to observe benefits, or let them hear from another source, i.e. the NGO in our context.

Along these lines, a field day serves as a venue where farmers can learn about a new technology, hear the experiences of demonstrators, and observe performance.[18] There are at least four mechanisms through which field days could increase adoption. First, information about the existence of Swarna-Sub1 diffuses imperfectly through networks. The field day causes knowledge about the existence of the new variety to diffuse to more people. As a result, some of these newly informed individuals adopt, increasing village-level adoption rates.

Second, beyond just learning that a new technology exists, farmers may not learn enough from demonstrators via normal social interactions. The ability to hear from multiple demonstrators, or see their crops, makes knowledge more precise and can increase the likelihood of adoption. One example would be a farmer that learns about the new variety from a demonstrator and thus possesses some signal of its effectiveness on her land. In this case the field day might aggregate the experiences of other demonstrators outside of this farmer's

[18] A more passive approach would be to rely on informal communication through social networks to transmit this information. However, any model that requires farmer-to-farmer learning suffers from the reality that farmers gain little from sharing information with others, i.e. demonstration and information-sharing create spillover benefits. This necessitates some method of encouraging the spread of information — direct incentives to demonstrators in the case of BenYishay and Mobarak (2018). In our case, the field day encourages the spread of information beyond what would have happened naturally in social networks.

social network. If the farmer needs to observe the experience of more than one demonstrator to adopt herself — as in Beaman et al. (2018) — then field days increase the likelihood of crossing this threshold by giving the opportunity to hear more from demonstrators.

Third, farmers may learn from demonstrators attending the field days, other farmers in attendance, or even the NGO staff. Fourth, physically verifying the main benefits of the technology might lead to greater adoption. Swarna-Sub1 looks visibly more healthy than other seed varieties after flooding. Farmers may not notice this, or may not observe the fields of demonstrators. The field day might induce farmers to actually observe this benefit, which could then lead to more adoption.

In sum, there are multiple channels through which farmers may learn more at a field day. Disentangling these channels would provide useful insights for policy. For instance, field days might not be the cheapest policy tool if spreading awareness explains their effectiveness. Spreading awareness on a large scale could likely be achieved more cost effectively by harnessing information technology. Or, policy approaches to make field days more effective would depend on whether their efficacy is being driven by better learning from demonstrators or the NGO / extension agent. If the former, then subsidizing demonstrator participation might increase the benefits of field days. Our experiment does not allow us to perfectly tease apart these possible channels. We provide some analysis in Section 4.6 that delivers suggestive evidence on which channels might be the most important.

Improved selection of entry points is an alternative policy mechanism for increasing adoption. The literature has considered different methods for identifying people that are best positioned to spread information in social networks. These methods span from asking a sample of villagers who is optimal for spreading information (Banerjee et al., 2019) to full elicitation of the structure of the village social network (Beaman et al., 2018). We borrow from the literature on targeting of anti-poverty programs to pose village meetings as an alternative for identifying demonstrators. This literature has found that villagers possess information on poverty status that is otherwise unobservable to a principal (Alatas et al., 2012). Does the same hold for information on the best entry points for new agricultural technology? Recent work by Banerjee et al. (2019) finds that Indian villagers are indeed effective at identifying people that are central for diffusing very simple information. Yet, this may not imply that villagers hold the same information on who is best for demonstrating (through their actions of actually growing) and spreading information about new agricultural technology. Village meetings have potential if villagers both possess this information and are able to aggregate it effectively to identify demonstrators. An additional possible benefit of meetings is that farmers may learn better from similar individuals, particularly when returns to the technology are heterogeneous (Munshi, 2004; Tjernström, 2017).

Relying on locally elected officials to identify demonstrators serves as our benchmark. This method may offer its own advantages. Basurto, Dupas, and Robinson (2019) show that chiefs in Malawi account for productivity differences when allocating subsidized inputs to villagers. If the batch of demonstrators identified by local elites is more productive, then this could have positive effects for future diffusion. The ability of village participation to improve selection of demonstrators is therefore an empirical question with no strong ex-ante prediction.

4 Results

Section 4.1 shows how the different treatments affected awareness about Swarna-Sub1 and knowledge about its attributes. Sections 4.2 to 4.4 then show the main effects on technology adoption, including heterogeneous effects. We apply the treatment effects to impact estimates of Swarna-Sub1 in Section 4.5 to show that field days are cost effective. Section 4.6 explores possible mechanisms.

4.1 Treatment effects on knowledge

Was there any measurable learning from the field days? Prior to the door-to-door sales, enumerators surveyed households to assess their knowledge of Swarna-Sub1. Farmers were asked several questions, starting with whether they had ever heard of Swarna-Sub1 and how many farmers they had spoken to about the variety. We then asked several multiple choice questions such as the two differences between Swarna-Sub1 and Swarna, the length of flooding that Swarna-Sub1 can tolerate, and the duration of Swarna-Sub1 (days from planting to harvesting).[19]

Our simple specification measures the average effect of field days (across all three selection mechanisms), as well as the effects of selecting demonstrators with village and SHG meetings:

$$y_{ivb} = \beta_0 + \beta_1 Meet_{vb} + \beta_2 SHG_{vb} + \beta_3 FieldDay_{vb} + \alpha_b + \varepsilon_{ivb}, \tag{1}$$

where y_{ivb} is a measure of knowledge (or later adoption) for household i in village v and block b. The parameter β_1 measures the average treatment effect of using meetings for selection, relative to relying on ward members. β_2 similarly measures the effect of using meetings of women's groups. We first estimate the average effect of field days — across all selection mechanisms — with the parameter β_3. The analysis that follows considers separate impacts for the three types of selection. The villages in the experiment were spread across three blocks (an administrative unit which was a stratification variable) and therefore we include block fixed effects. Finally, we cluster standard errors at the village level in all specifications.

Table 1 shows some modest effects of the field days on these observable measures of learning. Starting with column 1, farmers in field day villages report talking to an additional 0.12 famers about Swarna-Sub1 — an approximate 20 percent effect. Column 2 shows that farmers are six percentage points more likely to have ever heard of Swarna-Sub1 in field day villages. However, this is compared to a fairly high base: almost 80 percent of farmers knew

[19] In addition to flood tolerance, Swarna-Sub1 has a white husk, making it distinguishable from Swarna.

of Swarna-Sub1 in control villages. Knowledge on attributes of the technology in columns 3 through 8 are somewhat mixed. The strongest effect is in column 6 where field days led to an approximate 55 percent increase in knowledge of how long Swarna-Sub1 can survive when flooded. Column 8 shows that farmers in field day villages were slightly more likely to know the length of the growing cycle for Swarna-Sub1, although this effect is also modest because of high knowledge in the group without field days. Overall, column 9 shows that field days increased the number of total correct responses to the seven questions by about 0.25, or around 6 percent.

In contrast, the data show no evidence that participatory selection of demonstrators drives the spread of knowledge. The point estimates in column 2 show that awareness about Swarna-Sub1 increases by about the same amount as the field days. However, the remaining columns show no pattern of increased knowledge caused by the alternative modes of selection. Aggregating the number of correct responses in column 9 also shows evidence that the meetings did little to improve knowledge.

One possible explanation for the alternative selection methods not affecting results is that ward members select people similar to those selected during meetings. Table A4 shows that ward members were more likely to distribute seeds to themselves, their families, and close friends. Beyond this, the three selection mechanisms resulted in demonstrators with mostly similar socioeconomic and demographic characteristics. In other words, farmers selected by ward members are no less representative than those selected in the meetings. These similarities may explain why information transmits equally across treatments.

We find no evidence that the meetings were ineffective because they led to fewer demonstrators growing Swarna-Sub1. Despite having little effect on information diffusion, the meetings led to more demonstrators. Table A5 shows that village meetings increased the number of demonstrators and were over over twice as likely to result in more than five demonstrators being selected. Conditional on receiving seeds, Table A6 shows that SHG demonstrators were less likely to transplant them but uptake rates are similar between village meeting and ward member villages.[20]

4.2 Treatment effects on technology adoption

Measuring adoption using the door-to-door sales, we find that selecting demonstrators with meetings had no effect on adoption. The average effects of village and SHG meetings in column 1 of Table 2 are close to zero and statistically insignificant. These null effects are moderately precise. The 95 percent confidence interval allows us to reject increased adoption from meetings of more than 9.56 percentage points, or around 27 percent. Similarly, we reject increases in adoption of over 11.75 percentage points (44 percent) from SHG meetings. Columns 2 and 3 show that this conclusion changes little when separately estimating effects for purchasing one or two packages of seeds.

This finding has implications for identifying demonstrators in agricultural extension. Village participation in this process does not lead to greater levels of adoption. BenYishay and Mobarak (2018) find that once incentivized, the identity of demonstrators matters for technological diffusion. In particular, more representative peer demonstrators increase adoption relative to lead-farmer demonstrators. In our case, other than connections to ward members, the demographics of demonstrators remain similar across our treatments. The lack of incentives to demonstrators may therefore be less relevant compared to the ability of ward members to select demonstrators that are not too unrepresentative of the average villager.

In contrast, encouraging information transmission via field days drives adoption. Focusing on column 1, the field days increased adoption by 12.2 percentage points. The rate of adoption across villages without field days was 29.7 percent. The point estimate therefore indicates that bringing farmers together to discuss a new technology leads to a 41 percent gain in adoption. Column 2 shows a larger effect on adoption of a single package of seeds. Adoption of just one five kilogram package increases by 8.6 percentage points — or 59 per-

[20]The most common explanation for not transplanting the seeds was that flooding caused damage during the nursery stage, i.e. before seedlings had been transplanted in the main field. Swarna-Sub1 is not tolerant to submergence at this stage.

cent.[21] On the other hand, adoption of two packages increases by only 3.7 percentage points and this effect is statistically insignificant.[22] Our data do not allow us to pinpoint an exact reason for this difference. Nonetheless, one possibility is that the field days provided additional information to farmers that were near the threshold of testing the new seed, but they were less impactful for farmers that had already decided to plant the variety on a larger share of their land.

Figure 2 helps further understand this effect by showing the distribution of village-level adoption rates. Two things stand out. First, the field days decreased the frequency of little or no adoption at the village level. 35 percent of control villages had adoption rates lower than 10 percent. In contrast, only 12 percent of field day villages had such low adoption rates. Second, the distribution for field day villages puts much more mass on adoption rates greater than 50 percent. 38 percent of field day villages had adoption rates of 50 percent or higher, while only 19 percent of the control villages had at least half of the farmers adopt.

Figure 3 shows that the effect of field days is strongly correlated with attendance. The adoption of farmers in treatment villages that did not attend the field days is almost the same as those in the control villages. In contrast, the adoption rate is about 50 percent higher for attendees in treatment villages. Attendance is certainly non-random and likely correlated with household unobservables. Nonetheless, the result presents suggestive evidence that whatever learning happened at the field days likely did not spill over to non-attendees.[23]

[21] Five kilograms of seed is enough to cultivate about 10-20 percent of the average farmer's landholdings. Therefore, sowing this amount is not full adoption and still involves some experimentation.

[22] Including several household control variables does not change the main results (columns 4 through 6). The point estimates remain nearly identical to those that rely only on the experimental variation. This is not surprising given that the randomization was successful at achieving balance between the experimental groups.

[23] Table A7 further considers this by showing the same heterogeneity, but with knowledge outcomes. In line with the evidence on adoption, the field days only improved knowledge for attending farmers. Attending the field days is also associated with an increase in the number of conversations farmers report having about Swarna-Sub1. Most of these conversations are not with demonstrators, but are instead with people not growing Swarna-Sub1 (Table A8). These results suggest that field days create a venue to share information that farmers otherwise would not have shared. This information can come from people that are not current users of the technology, especially since they are larger in number. Banerjee et al. (2013) show that people without loans account for a meaningful share of the information diffusion about microfinance in Indian villages. Part of the reason for this is that there are more people without loans.

4.3 Does the effect of field days vary by method of selecting demonstrators?

The field days were no more effective when demonstrators were identified with meetings. Table 3 shows the full specification where the field day indicator is interacted with the indicators for village and SHG meetings. The second row shows that if anything, the field days were less effective when demonstrators were selected by SHG meetings. The coefficient on the interaction term between field days and SHG meetings is negative, somewhat large, but statistically insignificant. Similarly, the coefficient on the interaction between field days and village meetings is also negative and imprecisely estimated. The effect of field days with ward-member selection is 18.4 percentage points. The upper bound of the 95 percent confidence interval for the interaction term between field days and the SHG meeting indicator is 0.088. In other words, we can rule out that SHG meetings increased the field day effect by any more than 48 percent. The comparable number for village meetings is 15.8 percentage points, or an 86 percent increase in the effect size.[24]

Our findings suggest that farmers gain no more from field days when demonstrators are chosen by the village rather than by an elected official. Farmers appear to gain just as much — if not more — from participating in field days when demonstrators are identified by ward members.

Finally, we show that results change little when measuring adoption from all sources that we obtained from our census of all rice farmers. Column 1 in Table 4 shows that the coefficients for both village and SHG meetings remain small and statistically insignificant. However, we continue to estimate large positive effects of field days on seed demand at the village level. Field days caused an increase in adoption of 6.2 percentage points, or around 60 percent.[25] Column 2 shows that we still fail to detect significant interaction effects

[24]We gain more power by pooling the two types of meetings together (Table A9). When doing this, we are able to reject that the average effect of meetings on the effectiveness of field days is any larger by around 8.9 percentage points (48 percent).

[25]The much lower adoption rate at the village level is indicative of supply constraints. 36 percent of our sample that received door-to-door sales adopted, a number much larger than the adoption rate amongst other

between meetings and field days in this larger sample. We also test whether field days cause substitution towards Swarna-Sub1 and away from other types of seeds. Column 3 shows that the point estimate on the number of varieties grown is similar in magnitude to the effect of field days on adopting Swarna-Sub1. Also, we find no evidence that the field days led to a decrease in the number of other types of varieties being grown (column 4).

4.4 Who benefits the most from field days?

Turning to heterogeneity, the field days were most effective for poorer farmers, as measured by caste and below the poverty line status. First, around a third of the sample belongs to the scheduled castes or tribes, the most disadvantaged castes in the country. Members of scheduled castes and tribes obtain less education and earn lower incomes relative to higher caste individuals (Munshi and Rosenzweig, 2003). Column 1 in Table 5 shows that the marginal impact of field days on adoption for higher caste farmers is 8.2 percentage points. This impact increases to 20.1 percentage points for farmers belonging to the scheduled castes and tribes — however the large differential effect is not statistically significant (p=0.14). Column 2 shows that this differential effect is largely driven by inducing lower caste farmers to purchase a single package of seeds. The effect of field days on adoption of a single package is only 4.6 percentage points for higher caste farmers. In contrast, the effect is over three times larger for scheduled castes and tribes and the differential effect is statistically significant at the 10 percent level. Column 3 shows that there is virtually no differential effect for scheduled castes and tribes on the probability of purchasing two packages.

Second, we explore heterogeneity by having a "below the poverty line" card. About 62 percent of our sample holds one of these cards, which are allocated based on results from a proxy means test. Column 5 shows that field days are more effective at inducing BPL households to purchase a single package of seeds.

villagers. The 10 percent adoption rate in the control group, combined with little awareness at baseline, suggests that Swarna-Sub1 is gaining popularity. This might be driven by efforts to promote the variety by the state government.

Taken together, the results suggest that field days increase equity by delivering the largest impacts for the poorest farmers. These gains exist despite a lack of evidence that poor farmers learn better from field days. Tables A10 and A11 show that the effect of field days on observed learning is not significantly larger for either ST/SC or BPL households. Therefore, the differential effects on adoption must arise for a reason other than differential learning — at least for the attributes measured by our survey.

4.5 Are field days cost effective?

The field days are cost effective, delivering a benefit-cost ratio of around 1.14 after a single growing season (Table 6). To see this, we first measure the additional profit they create. The average village in our sample has 69 rice farming households and field days increased the adoption rate by 12.2 percentage points. Thus, a field day would be expected to generate around 8.42 additional adopters. In Emerick et al. (2016) we estimate revenue gains from Swarna-Sub1 of 10 percent, or about 49.4 dollars. This effect arises partly due to the crowd-in effect of inducing farmers to use more inputs. Taken together, the profit gain from adoption is approximately 31 dollars, meaning that field days generate one-year revenue gains of around 261 dollars at the village level. Next, we measure their cost. On average, the average cost of carrying out the field day was about 200 dollars. This figure includes all costs for the field partner including labor, transportation to the village, and inviting farmers to the field days. A rough estimate of the time cost to farmers of attending the field days is 29.9 dollars.[26]

On the one hand, this calculation is encouraging because many farmers reuse seeds and continue to benefit from Swarna-Sub1 over multiple seasons. The one-year benefit therefore gives a lower bound on the flow of benefits received from continued adoption. On the other hand, the calculation should be interpreted with caution for two reasons. First, it is unclear whether the average cost of the treatment would rise (or possibly fall) with wider

[26]This calculation is based on daily wages of 174 rupees (2.9 dollars), i.e. the wage in the central government's labor guarantee program. We multiply this by 0.25 since the field days took approximately two hours. Finally, an average of 41 farmers attended the field days.

implementation. There could be additional costs of coordinating field days in a broader area. Second, our estimated treatment effect is conditional on the absence of supply frictions. We can only think of field days as being cost effective when seeds are readily available to farmers at market prices.[27]

4.6 What explains why field days are effective?

Numerous reasons exist for why the field days increase adoption. We list four possible explanations. First, the field days could simply increase awareness about the existence of Swarna-Sub1. Second, they could allow farmers to gain information from multiple demonstrators, i.e. allow for better information aggregation. Third, they could have also made the difficulty of finding Swarna-Sub1 seeds more salient. Doing so may convince farmers to purchase when visited by a salesperson. Fourth, field days may have complemented regular social learning, either by inducing farmers to communicate in ways they otherwise would not have, or because the NGO could have provided additional information that did not transmit through networks. While the experiment does not allow us to distinguish between these explanations, we can explore the data to understand which mechanisms might be in operation.

The awareness mechanism seems unlikely. While the field days increased awareness (Tables 1 and A7), the effect size is small and most farmers knew about Swarna-Sub1 independently of the field days. Moreover, the field days also increased adoption for demonstrators.[28] Table 7 shows that demonstrators were 11.8 percentage points more likely to adopt Swarna-Sub1 in 2015 if they resided in a field day village. Demonstrators did not need field days to gain awareness — further suggesting this is not the mechanism.

We next show suggestive evidence that the field day effect is not driven by information sharing from demonstrators. Figure 4 shows the adoption differences between field day and

[27]Using the treatment effect on overall adoption in Table 4, we calculate a benefit-cost ratio of 0.58. In other words, the field days would take about 1.7 years to pay for themselves.

[28]We were able to match 397 of the demonstrators by name to the 2015 adoption survey. The matching rate is uncorrelated with the field days treatment.

control villages as a function of the number of demonstrators. There is no evidence that the field-day effect increases with the number of demonstrators. Moreover, the figure shows a weak correlation between adoption and the number of demonstrators attending the field day. Finally, the above results showed no evidence that selecting demonstrators with meetings led to more effective field days, despite the fact that more demonstrators attended the field days in the meeting villages.[29]

The use of door-to-door sales raises the question of another mechanism. Perhaps the field days caused farmers to notice that Swarna-Sub1 is hard to find. This may trigger them to capitalize on a buying opportunity when a door-to-door salesperson shows up. We might expect the field days to have a different effect for a widely available technology if this is the true mechanism. The adoption survey with the whole village — not just the door-to-door sample — provides an opportunity to test this mechanism. Table A13 shows that a treatment effect still exists when we remove farmers that were part of the door-to-door sample. This evidence suggests that the effect of field days is not being driven by the method used to elicit demand.

Finally, we find no evidence that field days are more effective in areas exposed to flooding. We calculate the distance beween demonstrator plots and flooded areas using daily images from the Modis satellite.[30] Table A14 shows heterogenous effects based on proximity between the demonstrator plots and flooding. We find no evidence that field days work better when flooding causes the main benefit of Swarna-Sub1 to become more apparent. This finding helps rule out a mechanism where the field days give farmers an opportunity to verify benefits of a new technology.

Combining all results, we find that going to field days enhances learning and increases adoption. This does not seem to be driven by learning more from demonstrators or by

[29]Table A12 shows that 2.7 additional demonstrators attended the field days in meeting villages, relative to 3.31 attendees in ward member villages.

[30]The images have a 250m resolution and are available at *http://floodobservatory.colorado.edu/*. We define a plot to be flooded if it was within 250 or 500 meters of a flooded pixel on any of the days between June 1 and October 31, 2014 (the five months preceding the field days).

validating the main benefit of the technology. The results instead suggest that farmers need more information than the amount transmitted from demonstrators. The field days most likely work because they provide that information or endorsement.

5 Conclusion

Farmers need to be convinced about a new technology before adopting it. We have shown that the farmer field day — where farmers come together to learn about and discuss a new technology — improves learning and achieves increased adoption in a cost effective manner. The magnitude of this effect is non-trivial: field days in our experiment increased adoption rates by 40 percent. This result suggests that learning is a key friction that slows the diffusion of agricultural technology and that field days serve as an effective mechanism for alleviating this friction. While we are not able to exactly pinpoint the mechanism behind this effect, we found suggestive evidence that participants may have benefitted from learning from other people that were not using the technology — either other participants or the NGO running the field day.

We also tested whether the ex-ante selection of demonstrators can be improved by seeking the input of farmers through village meetings. We found that these meetings do change the composition of the group of demonstrators. More specifically, using meetings shifts the pool of demonstrators away from friends and family of the locally elected political figures. However, this has no meaningful effect on technology adoption one season later. This result in no way means that careful selection of demonstrators is unimportant. Instead, our results suggest that using meetings to engage villagers in this selection process does little to drive adoption. Thus, future work is needed to identify the most policy-relevant and scalable methods to improve the selection of demonstrators.

The experiment delivers a straightforward policy lesson. Models of agricultural extension that rely on contact or "lead" farmers, and the spread of information from these farmers to other farmers, can result in under-adoption of profitable technology. Consequently, there is room to increase adoption by intervening to encourage farmers to better learn from each other's experience. Rather than exploiting social learning alone, improved extension models could combine social learning from selected contact farmers with simple interventions to improve learning.

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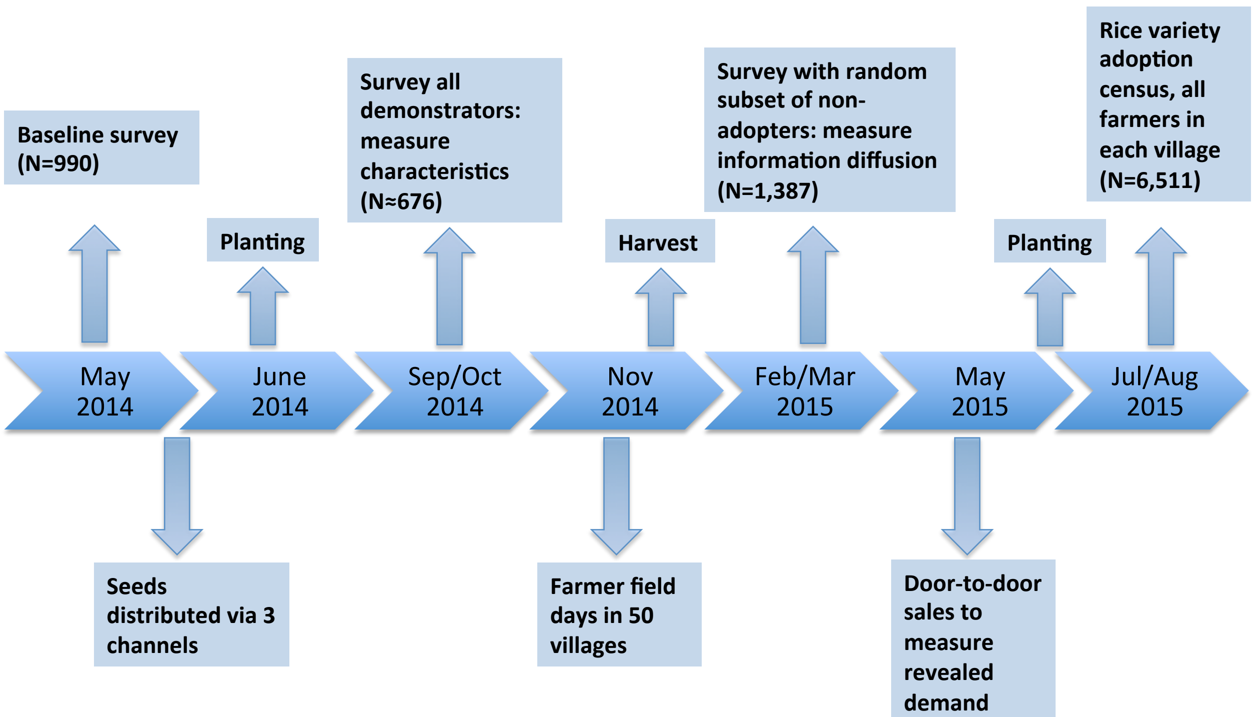
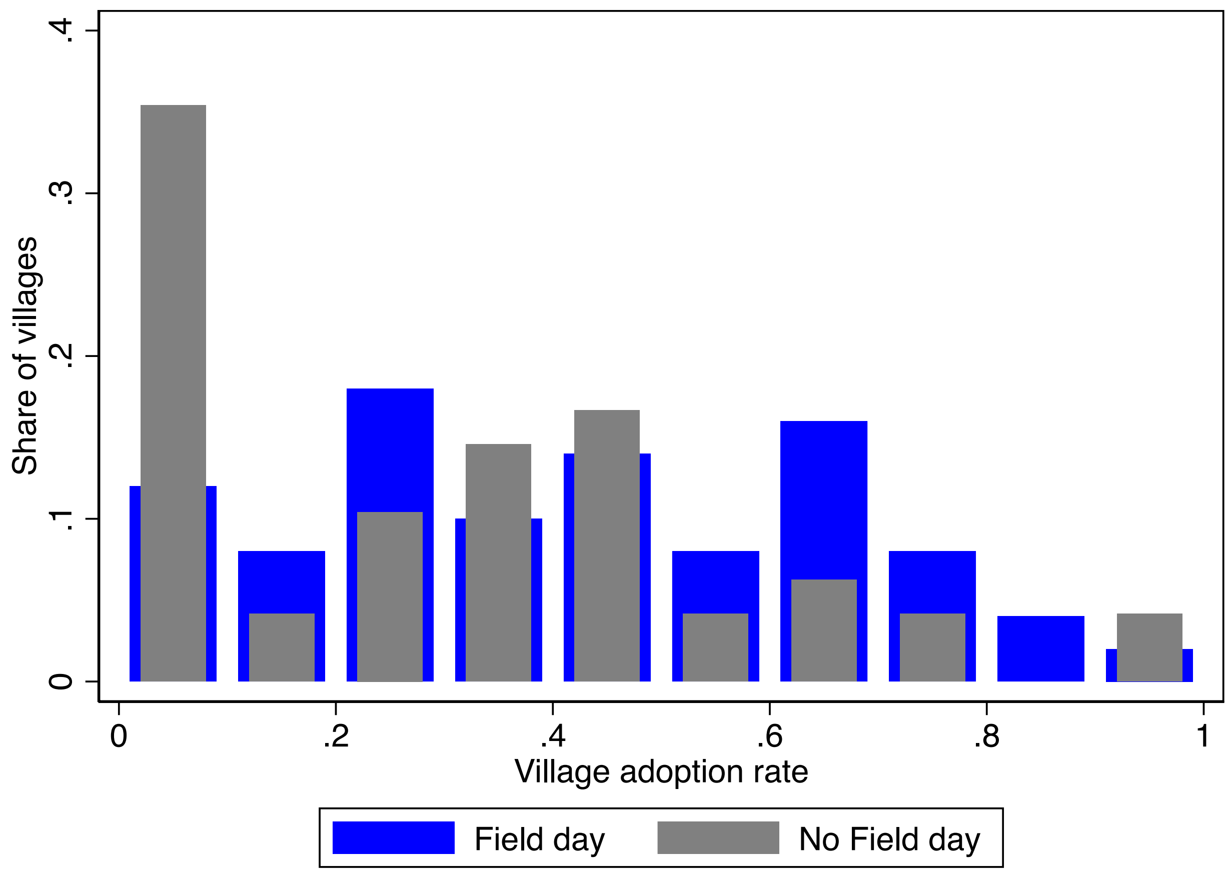
Figures

Figure 1: Timeline of the experimental design



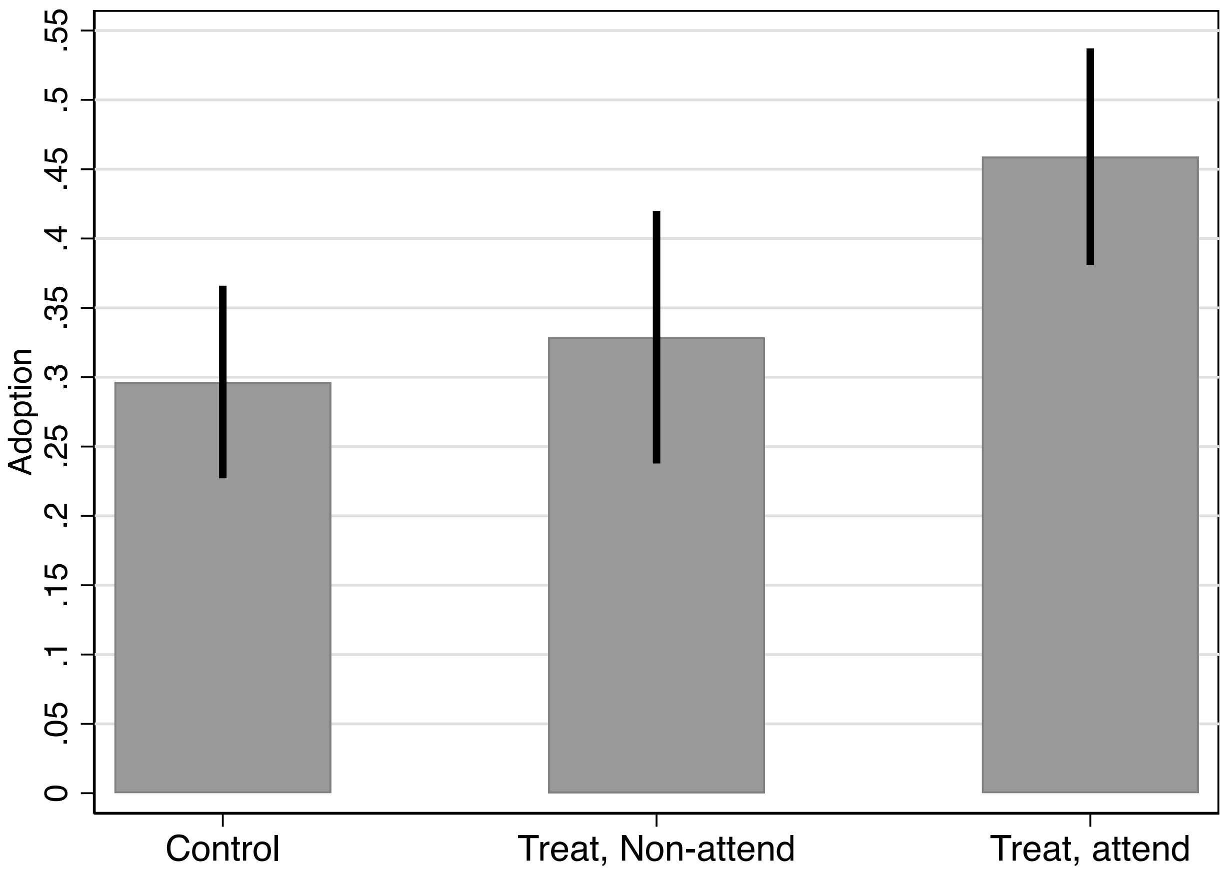
Notes: The figure shows the timing of the activities that were carried out as part of the experiment. Planting for each season occurs in June and harvesting generally occurs in late November to December.

Figure 2: Distribution of village-level adoption rates by treatment



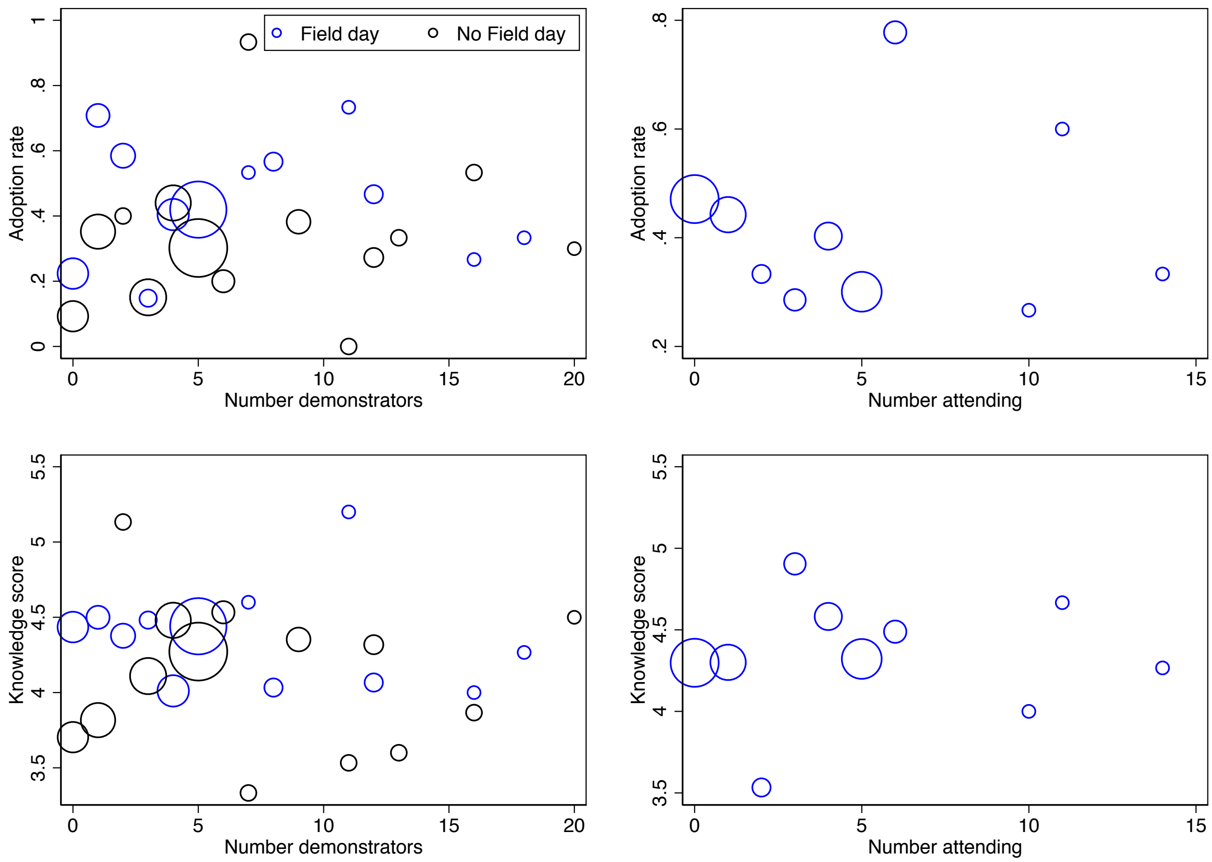
Notes: The figure shows the distribution of the village-level adoption rate for field day and non-field day villages separately. The distributions are based on the adoption data for the approximately 15 farmers per village that received door-to-door sales.

Figure 3: Adoption rates separately for field day attendees and non-attendees



Notes: The figure shows the raw adoption rates for farmers in control villages, farmers in treatment (field day) villages that did not attend the field days, and farmers in treatment villages that attended the field days. The black heavy lines are 95 percent confidence intervals, where standard errors are clustered at the village level.

Figure 4: Correlations between adoption, knowledge, number of demonstrators and number attending the field day



Notes: The upper left panel shows the correlation between adoption and the number of demonstrators in the village that transplanted Swarna-Sub1, separately for field day (blue) and control (black) villages. The size of each bubble is proportional to the number of villages for each treatment - number of demonstrator combination. The lower left panel depicts the same thing except for the knowledge score instead of adoption. The upper right figure shows the correlation between adoption and the number of demonstrators that attended the field day, where the size of each bubble is again proportional to the number of observations. The lower right figure shows the correlation between knowledge and the number of adopting demonstrators. Knowledge is defined as the total number of correct responses, as in Table 1 column 9.

Tables

Table 1: Effects of field days on knowledge

	(1) Number farmers talked to	(2) Ever heard of Swarna-Sub1	(3) Difference with Swarna	(4) Pesticide requirement	(5) Available at Block	(6) Maximum survival when flooded	(7) Most suitable land type	(8) Length of growing cycle	(9) Total correct 2-8
Field day	0.117*	0.056*	-0.038	-0.020	0.009	0.130***	0.058	0.068**	0.253*
	(0.064)	(0.030)	(0.042)	(0.053)	(0.054)	(0.045)	(0.039)	(0.034)	(0.136)
Village meeting	-0.045	0.050	0.033	-0.072	-0.045	0.079	0.020	0.020	0.086
	(0.079)	(0.038)	(0.054)	(0.064)	(0.066)	(0.059)	(0.044)	(0.043)	(0.181)
SHG meeting	0.035	0.062*	0.014	-0.035	-0.024	0.051	-0.020	0.024	0.088
	(0.079)	(0.035)	(0.046)	(0.061)	(0.062)	(0.054)	(0.048)	(0.043)	(0.159)
p-value Village=SHG	0.33	0.66	0.71	0.57	0.76	0.59	0.41	0.91	0.99
Mean in Ward villages	0.627	0.795	0.384	0.556	0.629	0.263	0.747	0.832	4.205
Number of Observations	1368	1384	1386	1386	1386	1386	1386	1386	1384
R squared	0.027	0.076	0.110	0.019	0.056	0.138	0.082	0.128	0.067

Data are for 1,387 households that were surveyed in between harvesting during the first season and planting for the second season. The dependent variables are as follows: Column 1 is the number of other farmers in the village talked to about Swarna-Sub1. Column 2 is an indicator for whether the respondent has ever heard of Swarna-Sub1 prior to the interview. Column 3 is an indicator for selecting both flood tolerance and husk color as the main differences between Swarna and Swarna-Sub1. Column 4 is an indicator for knowing that Swarna-Sub1 requires the same amount of pesticide as Swarna. Column 5 is an indicator for knowledge that Swarna-Sub1 is not available at the government block office (where farmers usually buy seeds). Column 6 is an indicator for knowing that knowledge that Swarna-Sub1 can survive up to 2 weeks when the field is flooded during the vegetative stage of the growing season. Column 7 is an indicator for knowledge that Swarna-Sub1 is most appropriate for medium land where flash flooding occurs. Column 8 is an indicator for knowledge that the duration (time from planting to harvest) of Swarna-Sub1 is approximately 140 days. Column 9 is the total number of correct responses in columns 2 through 8. All regressions include block fixed effects. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * level

Table 2: Effects of village selection of demonstrators and field days on technology adoption

	(1) Buy	(2) Buy 5 KG	(3) Buy 10 KG	(4) Buy	(5) Buy 5 KG	(6) Buy 10 KG
Village meeting	-0.018	0.009	-0.027	-0.014	0.015	-0.029
	(0.057)	(0.049)	(0.038)	(0.057)	(0.049)	(0.038)
SHG meeting	0.008	0.004	0.004	0.009	0.012	-0.003
	(0.055)	(0.051)	(0.038)	(0.053)	(0.050)	(0.038)
Field day	0.122**	0.086**	0.037	0.120**	0.082*	0.038
	(0.047)	(0.043)	(0.032)	(0.046)	(0.042)	(0.032)
HH Controls	No	No	No	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean in non-field day villages	0.297	0.147	0.150	0.297	0.147	0.150
Mean in Ward villages	0.357	0.185	0.172	0.357	0.185	0.172
Number of Observations	1384	1384	1384	1383	1383	1383
R squared	0.043	0.028	0.014	0.063	0.043	0.030

The dependent variable in columns 1 and 4 is an indicator for whether the farmer purchased Swarna-Sub1 when given a sales offer. The dependent variable in columns 2 and 5 is an indicator for purchase of 1 seed package (5 kg). The dependent variable in columns 3 and 6 is an indicator for purchase of at least 2 seed packages (10 kg). Household controls are indicator for ST or SC, indicator for BPL card, indicator for NREGS job card, cultivated area, indicator for thatched roof, indicator for mud walls, education of the farmer, age of the farmer, indicator for SHG membership, indicator for private tubewell ownership, indicator for cultivating Swarna, and elevation of the household. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 3: Interaction effects between farmer field days and meetings

	(1) Buy	(2) Buy 5 KG	(3) Buy 10 KG	(4) Buy	(5) Buy 5 KG	(6) Buy 10 KG
Field day	0.184**	0.139**	0.045	0.188***	0.142**	0.046
	(0.070)	(0.058)	(0.044)	(0.067)	(0.055)	(0.043)
Field day * SHG meeting	-0.125	-0.148	0.023	-0.137	-0.154	0.018
	(0.108)	(0.100)	(0.071)	(0.102)	(0.096)	(0.070)
Field day * Village meeting	-0.066	-0.020	-0.047	-0.073	-0.032	-0.041
	(0.113)	(0.098)	(0.075)	(0.110)	(0.094)	(0.075)
SHG meeting	0.073	0.082	-0.009	0.080	0.093	-0.013
	(0.082)	(0.073)	(0.042)	(0.079)	(0.071)	(0.043)
Village meeting	0.015	0.017	-0.002	0.021	0.028	-0.007
	(0.078)	(0.055)	(0.058)	(0.075)	(0.053)	(0.057)
HH Controls	No	No	No	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean in non-field day villages	0.297	0.147	0.150	0.297	0.147	0.150
Mean in Ward villages	0.357	0.185	0.172	0.357	0.185	0.172
Number of Observations	1384	1384	1384	1383	1383	1383
R squared	0.046	0.035	0.015	0.066	0.050	0.031

The dependent variable in columns 1 and 4 is an indicator for whether the farmer purchased Swarna-Sub1 when given a sales offer. The dependent variable in columns 2 and 5 is an indicator for purchase of 1 seed package (5 kg). The dependent variable in columns 3 and 6 is an indicator for purchase of at least 2 seed packages (10 kg). Household controls are indicator for ST or SC, indicator for BPL card, indicator for NREGS job card, cultivated area, indicator for thatched roof, indicator for mud walls, education of the farmer, age of the farmer, indicator for SHG membership, indicator for private tubewell ownership, indicator for cultivating Swarna, and elevation of the household. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 4: Effects estimated for the entire village

	(1) Adoption	(2) Adoption	(3) Number Varieties	(4) Number Non-SS1 varieties
Village meeting	-0.008	-0.003	0.034	0.044
	(0.028)	(0.031)	(0.109)	(0.113)
SHG meeting	0.016	0.040	0.190*	0.174*
	(0.025)	(0.029)	(0.096)	(0.101)
Field day	0.062***	0.079**	0.095	0.033
	(0.022)	(0.033)	(0.085)	(0.088)
Field day * SHG meeting		-0.044		
		(0.046)		
Field day * Village meeting		-0.007		
		(0.056)		
Strata FE	Yes	Yes	Yes	Yes
Mean in non-field day villages	0.103	0.103	2.238	2.135
Mean in Ward villages	0.147	0.147	2.254	2.108
Number of Observations	6511	6511	6500	6500
R squared	0.054	0.055	0.123	0.074

The dependent variable in columns 1 and 2 is an indicator for whether the farmer adopted Swarna-Sub1 for the 2015 season. The dependent variable in column 3 is the total number of rice varieties grown, while the dependent variable in column 4 is the number of non Swarna-Sub1 varieties grown. The data are from a census of varietal adoption that was carried out with all households in each village shortly after planting decisions were made for the 2015 season. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 5: Differential effects of field days as functions of caste and poverty status

	(1) Buy	(2) Buy 5 KG	(3) Buy 10 KG	(4) Buy	(5) Buy 5 KG	(6) Buy 10 KG
Field day	0.082	0.046	0.036	0.071	0.022	0.049
	(0.050)	(0.048)	(0.038)	(0.061)	(0.056)	(0.039)
Field day * ST or SC	0.119	0.112*	0.007			
	(0.079)	(0.066)	(0.055)			
Field day * BPL card				0.080	0.098*	-0.019
				(0.060)	(0.056)	(0.043)
SHG meeting	0.008	0.011	-0.003	0.008	0.011	-0.003
	(0.053)	(0.050)	(0.038)	(0.053)	(0.050)	(0.038)
Village meeting	-0.017	0.012	-0.029	-0.014	0.015	-0.029
	(0.056)	(0.049)	(0.038)	(0.056)	(0.048)	(0.038)
HH Controls	Yes	Yes	Yes	Yes	Yes	Yes
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean in non-field day villages	0.297	0.147	0.150	0.297	0.147	0.150
Mean in Ward villages	0.357	0.185	0.172	0.357	0.185	0.172
Number of Observations	1383	1383	1383	1383	1383	1383
R squared	0.066	0.047	0.030	0.065	0.047	0.030

The dependent variable in columns 1 and 4 is an indicator for whether the farmer purchased Swarna-Sub1 when given a sales offer. The dependent variable in columns 2 and 5 is an indicator for purchase of 1 seed package (5 kg). The dependent variable in columns 3 and 6 is an indicator for purchase of at least 2 seed packages (10 kg). Household controls are indicator for ST or SC, indicator for BPL card, indicator for NREGS job card, cultivated area, indicator for thatched roof, indicator for mud walls, education of the farmer, age of the farmer, indicator for SHG membership, indicator for private tubewell ownership, indicator for cultivating Swarna, and elevation of the household. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 6: Parameters of the cost effectiveness calculation

	(1) Value
Benefits	
1. Effect on Swarna-Sub1 adoption rate (Table 2)	0.122
2. Number of rice-farming households per village	69
3. Number of expected adopters from field day (item 1*item 2)	8.42
4. Increased revenue from Swarna-Sub1 adoption (Emerick et al., 2016)	$49.4
5. Cost of additional inputs (Emerick et al., 2016)	$18.35
6. Net benefit per adopter (item 4 - item 5)	$31.05
7. Total one-year benefit from field day per village (item 3*item 6)	$261.44
Costs	
8. Cost of administering field day by NGO, per village	$200
9. Average number of farmers attending	41
10. Time cost per attendee based on casual rural wage (2 hours)	$0.73
11. Total cost of farmer time (item 9*item 10)	$29.9
12. Total cost of field day per village (item 8 + item 11)	$229.9
One-year net benefit per village (item 7-item 12)	$31.54
One-year benefit-cost ratio (item 7/item 12)	1.14

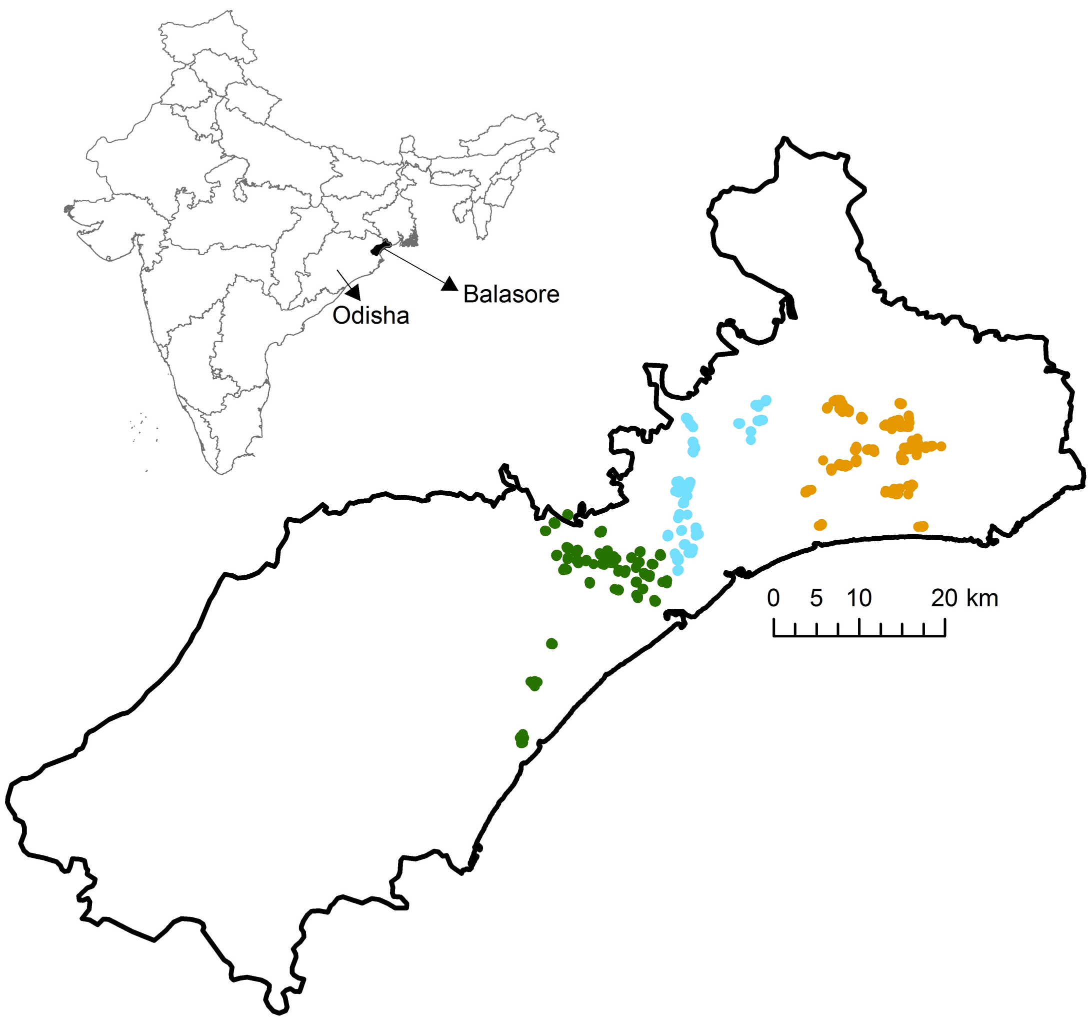
Table 7: Effects of field days on adoption of demonstrators during the 2015 season

	(1)	(2)
Field day	0.118**	0.118**
	(0.054)	(0.052)
SHG meeting		-0.033
		(0.079)
Village meeting		-0.101
		(0.066)
Strata FE	Yes	Yes
Mean in non-field day villages	0.178	0.178
Number of Observations	397	397
R squared	0.071	0.082

The dependent variable in both columns is an indicator for whether the farmer adopted Swarna-Sub1 for the 2015 season. The data are from a census of varietal adoption that was carried out with all households in each village shortly after planting decisions were made for the 2015 season. Both regressions are estimated only on the sample of farmers that were matched to the list of demonstrators. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Appendix - For Online Publication

Figure A1: Map of experimental sites



Notes: The upper left corner of the map shows the location of Balasore district in Odisha state. The lower portion shows the boundaries of Balasore district and the locations of the experiment (one dot per household at baseline). The colors of the dots show the three blocks which were strata for the randomization. The orange dots show households in Baliapal, blue in Basta, and green in Balasore Sadar block.

Table A1: Correlates of farmer field day attendance

	(1)	(2)	Interactions: (3) SHG	(4) Meeting
SHG meeting	0.017	0.018	-0.164	
	(0.097)	(0.094)	(0.223)	
Village meeting	0.026	0.027		0.011
	(0.089)	(0.088)		(0.196)
Scheduled Caste or Tribe		0.056	0.021	0.057
		(0.046)	(0.049)	(0.073)
Has SHG member		0.022	0.008	0.014
		(0.044)	(0.051)	(0.060)
Age of farmer		0.001	-0.000	0.001
		(0.001)	(0.002)	(0.002)
Years education		0.012*	0.011	0.007
		(0.006)	(0.007)	(0.009)
BPL card holder		-0.029	-0.001	-0.044
		(0.045)	(0.054)	(0.058)
Rice area		-0.009	-0.020	0.000
		(0.014)	(0.018)	(0.018)
Interaction with:				
Has SHG member			0.034	0.025
			(0.096)	(0.075)
Scheduled Caste or Tribe			0.111	-0.014
			(0.115)	(0.086)
Age of farmer			0.002	-0.001
			(0.003)	(0.003)
Years education			0.001	0.014
			(0.013)	(0.011)
BPL card holder			-0.070	0.052
			(0.102)	(0.096)
Rice area			0.025	-0.033
			(0.030)	(0.027)
Strata FE	Yes	Yes	Yes	Yes
p-value Village=SHG	0.90	0.90		
Mean in Ward villages	0.671	0.671	0.671	0.671
Number of Observations	723	721	721	721
R squared	0.129	0.141	0.146	0.148

The dependent variable in all regressions is an indicator for attending the farmer field day, which was self reported at the time of the information survey in February / March 2015. The data are for the 50 villages where field days took place. Columns 3 and 4 test whether the field days were attended by different types of people in SHG meeting and village meeting villages, respectively. To do so, column 3 includes interaction terms between the SHG meeting indicator and the covariates. Column 4 includes interaction terms between the village meeting indicator and the covariates. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table A2: Summary statistics and balance tests across field days treatments

	Means		
	No Field Day	Field Day	p-value
Access to electricity	0.784	0.750	0.428
Mud walls	0.579	0.563	0.528
Thatched roof	0.333	0.340	0.934
Number rooms in house	2.044	2.192	0.131
Years education	5.998	5.964	0.916
Area cultivated in wet season (acres)	2.310	2.095	0.627
Private tubewells in house	0.354	0.332	0.919
Number of cows owned	1.805	1.864	0.618
Swarna user	0.526	0.610	0.090
Has SHG member	0.635	0.649	0.578
Owns mobile phone	0.792	0.837	0.121
BPL card holder	0.598	0.633	0.322
NREGS job card holder	0.671	0.643	0.459
Scheduled Caste or Tribe	0.312	0.337	0.753
Owns television	0.529	0.542	0.690
Owns motorbike	0.175	0.196	0.369
Owns refrigerator	0.042	0.061	0.154

The table shows summary statistics and balance tests using the main estimation sample of 1,387 farmers. Column 1 displays the mean value of each characteristic in the 50 villages without farmer field days. Column 2 shows mean values in the field day villages. Column 3 shows the p-values for tests of equality, where standard errors are clustered at the village level and each regression includes block fixed effects (randomization strata).

Table A3: Summary statistics and balance tests across selection treatments

	Means			
	Ward Member	SHG Meeting	Village Meeting	Joint p-value
Access to electricity	0.780	0.728	0.788	0.412
Mud walls	0.558	0.597	0.558	0.663
Thatched roof	0.326	0.387	0.300	0.189
Number rooms in house	2.098	2.162	2.107	0.854
Years education	5.905	6.211	5.836	0.711
Area cultivated in wet season (acres)	1.874	2.655	2.093	0.362
Private tubewells in house	0.367	0.342	0.317	0.666
Number of cows owned	1.811	1.836	1.862	0.976
Swarna user	0.604	0.515	0.589	0.331
Has SHG member	0.670	0.651	0.604	0.415
Owns mobile phone	0.849	0.810	0.786	0.173
BPL card holder	0.556	0.649	0.648	0.057
NREGS job card holder	0.616	0.685	0.672	0.388
Scheduled Caste or Tribe	0.357	0.219	0.396	0.023
Owns television	0.552	0.490	0.565	0.335
Owns motorbike	0.185	0.172	0.201	0.690
Owns refrigerator	0.046	0.047	0.063	0.489

The table shows summary statistics and balance tests using the sample of 1,387 farmers that were not demonstrators during year one. Column 1 displays the mean value in villages where ward members (local politicians) were used to determine demonstrators. Columns 2 and 3 show means in villages where demonstrators were selected by SHG meetings and village meetings, respectively. Column 4 shows the p-values for equality of means in all three arms. Standard errors are clustered at the village level and each regression includes block fixed effects (randomization strata).

Table A4: Characteristics of demonstrators

		Coefficients and SE:		
	(1) Ward Mean	(2) Village meeting	(3) SHG meeting	(4) p-value (2)-(3)
Ward member, family, or close friend	0.305*** (0.040)	-0.096* (0.054)	-0.188*** (0.054)	0.074
HH has elected panchayat representative	0.114*** (0.023)	-0.064** (0.026)	-0.082*** (0.026)	0.319
Has SHG member	0.476*** (0.071)	0.056 (0.092)	0.508*** (0.071)	0.000
Family or close friend with an SHG president	0.257*** (0.061)	-0.099 (0.069)	-0.060 (0.072)	0.439
Self reported village leader	0.257*** (0.033)	-0.023 (0.044)	-0.028 (0.054)	0.922
Cooperative member	0.210*** (0.051)	-0.001 (0.068)	0.179** (0.088)	0.035
Scheduled Caste or Tribe	0.462*** (0.088)	-0.034 (0.111)	-0.196* (0.104)	0.066
Years education	5.652*** (0.599)	-0.293 (0.710)	0.092 (0.729)	0.497
Age of farmer	49.010*** (0.992)	1.526 (1.344)	-7.646*** (1.337)	0.000
Area cultivated	2.232*** (0.212)	-0.096 (0.279)	-0.305 (0.234)	0.312
Mud walls	0.533*** (0.059)	0.053 (0.073)	0.041 (0.088)	0.881
BPL Card holder	0.610*** (0.062)	0.026 (0.078)	0.023 (0.081)	0.973
Number of cows owned	2.790*** (0.234)	-0.509* (0.296)	-0.806*** (0.296)	0.247
Sharecrops land	0.452*** (0.067)	-0.024 (0.079)	-0.037 (0.088)	0.856
Cognitive ability	3.015*** (0.086)	-0.033 (0.130)	-0.119 (0.136)	0.552

The data are from the first survey with all 676 demonstrators. Each row shows regression coefficients of the listed characteristic on indicators for village meeting and SHG meeting villages. The omitted category is the ward member villages and thus the coefficient reported in column 1 is the constant for each regression. Column 4 reports the p-value for the test of equality of the village meeting and SHG meeting villages. Standard errors that are clustered in the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table A5: Characteristics of demonstration across treatments

	(1) KG planted	(2) Number demonstrators	(3) More than 5 demonstrators	(4) Acres transplanted
Village meeting	0.112	1.862	0.236**	0.052
	(0.597)	(1.200)	(0.115)	(0.126)
SHG meeting	-0.339	-0.498	0.104	-0.197
	(0.991)	(0.936)	(0.113)	(0.133)
p-value Village=SHG	0.63	0.03	0.28	0.07
Mean in Ward member villages	24.31	6.56	0.22	0.86
Number of Observations	96	96	96	96
R squared	0.003	0.054	0.043	0.040

The data are from the first survey with all 676 demonstrators of Swarna-Sub1 and are collapsed to the village level. The survey was carried out in 96 of the 100 villages. The dependent variables are the total amount of kilograms planted in the nursery bed in the village (column 1), the total number of farmers that received any seed during year 1 (column 2), an indicator variable if there were more than 5 demonstrators in the village (column 3), and the total acres transplanted in the main field (column 4). Heteroskedasticity robust standard errors are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table A6: Predictors of planting Swarna-Sub1 among demonstrators

	(1)	(2)
Village meeting	-0.075	-0.057
	(0.085)	(0.080)
SHG meeting	-0.194**	-0.185*
	(0.086)	(0.096)
Field day	0.028	0.033
	(0.071)	(0.064)
Ward member, family, or close friend		-0.043
		(0.048)
HH has elected panchayat representative		0.013
		(0.077)
Has SHG member		0.009
		(0.061)
Self reported village leader		0.004
		(0.047)
Cooperative member		0.068
		(0.044)
Scheduled Caste or Tribe		-0.053
		(0.048)
Years education		0.011**
		(0.005)
Age of farmer		0.001
		(0.002)
Area cultivated		0.002
		(0.014)
Mud walls		-0.034
		(0.037)
BPL Card holder		-0.131***
		(0.035)
Number of cows owned		0.005
		(0.008)
Sharecrops land		0.079*
		(0.045)
Cognitive ability		0.004
		(0.025)
p-value Village=SHG	0.21	0.16
Mean in Ward member villages	0.78	0.78
Number of Observations	676	653
R squared	0.156	0.210

The data are from the first survey with all 676 demonstrators of Swarna-Sub1 and are collapsed to the village level. The survey was carried out in 96 of the 100 villages. The dependent variable in both columns is an indicator for whether the demonstrating farmer cultivated Swarna-Sub1. Cultivation is defined as transplanting the seedlings in the main field. Both regressions include block (strata) fixed effects. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table A7: Effects of field days on knowledge, by attendance

	(1) Number farmers talked to	(2) Ever heard of Swarna-Sub1	(3) Difference with Swarna	(4) Pesticide requirement	(5) Available at Block	(6) Maximum survival when flooded	(7) Most suitable land type	(8) Length of growing cycle	(9) Total correct 2-8
Attended Field day	0.205***	0.096***	0.035	-0.051	0.049	0.191***	0.119***	0.067*	0.494***
	(0.073)	(0.032)	(0.045)	(0.058)	(0.058)	(0.048)	(0.038)	(0.037)	(0.149)
Did not attend Field day	-0.089	-0.035	-0.208***	0.052	-0.083	-0.014	-0.083	0.070	-0.309*
	(0.062)	(0.043)	(0.044)	(0.054)	(0.060)	(0.047)	(0.052)	(0.049)	(0.163)
Village meeting	-0.052	0.047	0.028	-0.069	-0.048	0.075	0.016	0.020	0.069
	(0.078)	(0.037)	(0.052)	(0.063)	(0.065)	(0.056)	(0.041)	(0.043)	(0.172)
SHG meeting	0.032	0.061*	0.011	-0.034	-0.026	0.049	-0.023	0.024	0.079
	(0.078)	(0.034)	(0.043)	(0.060)	(0.061)	(0.051)	(0.046)	(0.043)	(0.148)
p-value Attend=Non Attend	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.95	0.00
Mean in Ward villages	0.627	0.795	0.384	0.556	0.629	0.263	0.747	0.832	4.205
Number of Observations	1368	1384	1386	1386	1386	1386	1386	1386	1384
R squared	0.040	0.089	0.135	0.024	0.063	0.158	0.104	0.128	0.098

Data are for 1,387 households that were surveyed in between harvesting during the first season and planting for the second season. The dependent variables are as follows: Column 1 is the number of other farmers in the village talked to about Swarna-Sub1. Column 2 is an indicator for whether the respondent has ever heard of Swarna-Sub1 prior to the interview. Column 3 is an indicator for selecting both flood tolerance and husk color as the main differences between Swarna and Swarna-Sub1. Column 4 is an indicator for knowing that Swarna-Sub1 requires the same amount of pesticide as Swarna. Column 5 is an indicator for knowledge that Swarna-Sub1 is not available at the government block office (where farmers usually buy seeds). Column 6 is an indicator for knowing that knowledge that Swarna-Sub1 can survive up to 2 weeks when the field is flooded during the vegetative stage of the growing season. Column 7 is an indicator for knowledge that Swarna-Sub1 is most appropriate for medium land where flash flooding occurs. Column 8 is an indicator for knowledge that the duration (time from planting to harvest) of Swarna-Sub1 is approximately 140 days. Column 9 is the total number of correct responses in columns 2 through 8. All regressions include block fixed effects. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * level

Table A8: Field days and conversations about Swarna-Sub1

	Conversations about Swarna-Sub1 with:	
	(1) Demonstrators	(2) Others
Attended Field day	0.045	0.130*
	(0.039)	(0.071)
Did not attend Field day	-0.076*	-0.019
	(0.040)	(0.063)
Village meeting	-0.069	0.012
	(0.043)	(0.075)
SHG meeting	-0.116***	0.136*
	(0.042)	(0.081)
p-value Attend=Non Attend	0.00	0.02
Mean in Ward villages	0.247	0.386
Number of Observations	1386	1386
R squared	0.024	0.036

Data are for 1,387 households that were surveyed in between harvesting during the first season and planting for the second season. The dependent variables are the number of reported conversations about Swarna-Sub1 with demonstrators (column 1) and non-demonstrators (column 2). All regressions include block fixed effects. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * level

Table A9: Interaction effects when pooling two meeting types together

	(1) Buy	(2) Buy 5 KG	(3) Buy 10 KG
Village or SHG meeting	0.043	0.048	-0.006
	(0.070)	(0.053)	(0.042)
Field day	0.184**	0.140**	0.045
	(0.070)	(0.059)	(0.044)
Village or SHG meeting * Field day	-0.095	-0.083	-0.012
	(0.093)	(0.081)	(0.061)
Strata FE	Yes	Yes	Yes
Mean in non-field day villages	0.297	0.147	0.150
Mean in Ward villages	0.357	0.185	0.172
Number of Observations	1384	1384	1384
R squared	0.045	0.030	0.013

The dependent variable in column 1 is an indicator for whether the farmer purchased Swarna-Sub1 when given a sales offer. The dependent variable in column 2 is an indicator for purchase of 1 seed package (5 kg). The dependent variable in column 3 is an indicator for purchase of at least 2 seed packages (10 kg). Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table A10: Heterogeneous effect of field days on knowledge by caste

	(1) Ever heard of Swarna-Sub1	(2) Number farmers talked to	(3) Difference with Swarna	(4) Maximum survival when flooded	(5) Most suitable land type	(6) Length of growing cycle
Field day	0.064*	0.071	-0.035	0.179***	0.049	0.086**
	(0.036)	(0.079)	(0.048)	(0.048)	(0.042)	(0.037)
Field day * ST or SC	-0.015	0.144	-0.008	-0.140*	0.027	-0.049
	(0.048)	(0.104)	(0.075)	(0.073)	(0.065)	(0.064)
ST or SC	0.038	-0.122*	0.016	0.031	-0.044	-0.036
	(0.039)	(0.066)	(0.055)	(0.060)	(0.052)	(0.052)
Mean in control villages	0.794	0.572	0.431	0.243	0.725	0.819
Number of Observations	1384	1368	1386	1386	1386	1386
R squared	0.072	0.027	0.109	0.139	0.082	0.135

Data are for 1,387 households that were surveyed in between harvesting during the first season and planting for the second season. The dependent variables are as follows: Column 1 is an indicator for whether the respondent has ever heard of Swarna-Sub1 prior to the interview. Column 2 is the number of other farmers in the village talked to about Swarna-Sub1. Column 3 is an indicator for selecting both flood tolerance and husk color as the main differences between Swarna and Swarna-Sub1. Column 4 is an indicator for knowledge that Swarna-Sub1 can survive up to 2 weeks when the field is flooded during the vegetative stage of the growing season. Column 5 is an indicator for knowledge that Swarna-Sub1 is most appropriate for medium land where flash flooding occurs. Column 6 is an indicator for knowledge that the duration (time from planting to harvest) of Swarna-Sub1 is approximately 140 days. All regressions include block fixed effects. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * level

Table A11: Heterogeneous effect of field days on knowledge by BPL status

	(1) Ever heard of Swarna-Sub1	(2) Number farmers talked to	(3) Difference with Swarna	(4) Maximum survival when flooded	(5) Most suitable land type	(6) Length of growing cycle
Field day	0.015	0.051	-0.026	0.218***	0.058	0.092**
	(0.029)	(0.086)	(0.056)	(0.053)	(0.050)	(0.045)
Field day * BPL Card	0.076	0.113	-0.015	-0.141**	-0.003	-0.041
	(0.046)	(0.110)	(0.062)	(0.060)	(0.059)	(0.039)
BPL Card	-0.088**	-0.150**	-0.070	0.068	-0.020	0.009
	(0.034)	(0.059)	(0.043)	(0.043)	(0.044)	(0.029)
Mean in control villages	0.794	0.572	0.433	0.244	0.728	0.821
Number of Observations	1384	1368	1384	1384	1384	1384
R squared	0.077	0.029	0.115	0.139	0.082	0.130

Data are for 1,387 households that were surveyed in between harvesting during the first season and planting for the second season. The dependent variables are as follows: Column 1 is an indicator for whether the respondent has ever heard of Swarna-Sub1 prior to the interview. Column 2 is the number of other farmers in the village talked to about Swarna-Sub1. Column 3 is an indicator for selecting both flood tolerance and husk color as the main differences between Swarna and Swarna-Sub1. Column 4 is an indicator for knowledge that Swarna-Sub1 can survive up to 2 weeks when the field is flooded during the vegetative stage of the growing season. Column 5 is an indicator for knowledge that Swarna-Sub1 is most appropriate for medium land where flash flooding occurs. Column 6 is an indicator for knowledge that the duration (time from planting to harvest) of Swarna-Sub1 is approximately 140 days. All regressions include block fixed effects. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * level

Table A12: Field day attendance by demonstrators across treatments

	(1) Any	(2) Planting Swarna-Sub1
SHG meeting	0.188	-1.312
	(1.103)	(0.909)
Village meeting	2.688**	2.062*
	(1.242)	(1.188)
Strata FE	Yes	Yes
p-value Village=SHG	0.03	0.00
Mean in Ward member villages	3.31	2.75
Number of Observations	48	48
R squared	0.157	0.228

The data are from 48/50 field day villages where we had the roster of attendees. The list of attendees was matched to the roster of demonstrators (and their spouses / fathers) to determine which demonstrator households had a member attending the field day. The dependent variable in column 1 is the number of demonstrators that attended the field day, while the dependent variable in column 2 is the number of attending demonstrators that planted Swarna-Sub1. Robust standard errors are in parentheses. Asterisks indicate that the coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table A13: Effects of field days for farmers not in door-to-door sample

	(1)	(2)
Village meeting	0.002	0.002
	(0.027)	(0.030)
SHG meeting	0.021	0.033
	(0.028)	(0.028)
Field day	0.058**	0.065**
	(0.023)	(0.032)
Field day * SHG meeting		-0.021
		(0.050)
Field day * Village meeting		0.000
		(0.054)
Strata FE	Yes	Yes
Mean in non-field day villages	0.059	0.059
Mean in Ward villages	0.097	0.097
Number of Observations	5483	5483
R squared	0.074	0.074

The dependent variable in both columns is an indicator for whether the farmer adopted Swarna-Sub1 for the 2015 season. The data are from a census of varietal adoption that was carried out with all households in each village shortly after planting decisions were made for the 2015 season. Both regressions exclude the farmers that received door-to-door sales visits, i.e. those in the main estimation sample. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table A14: Heterogeneous effect of field days by village-level exposure to flooding

	Distance from flooding:	
	(1)	(2)
	250 meters	500 meters
Field day	0.151***	0.123**
	(0.056)	(0.061)
Field day * Flooded	-0.097	-0.006
	(0.105)	(0.097)
Flooded	0.041	-0.035
	(0.076)	(0.067)
SHG meeting	0.013	0.012
	(0.056)	(0.056)
Village meeting	-0.016	-0.012
	(0.058)	(0.058)
Strata FE	Yes	Yes
Mean in non-field day villages	0.297	0.297
Mean in Ward villages	0.357	0.357
Number of Observations	1384	1384
R squared	0.045	0.044

The dependent variable in both columns is an indicator for whether the farmer purchased Swarna-Sub1 seeds. The flooding variable is a village level measure of exposure to flooding during the 2014 season. It is defined by using the GIS location of the demonstrator plots and calculating the distance to the nearest flooded pixel using Modis Imagery from the Dartmouth flood observatory (resolution 250 meters). A village is defined to be flood exposed if any Swarna-Sub1 demonstration field was within 250 meters (column 1) or 500 meters (column 2) of any flooded pixel during the period from June 1 to October 31, 2014. Standard errors that are clustered at the village level are in parentheses. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.