Smallholder Farmers & Climate Change

Voices from the Field

June, 2023

THE/NUDGE INSTITUTE

Supported by:

The Rockefeller Foundation

Preface (1/3)

The Nudge Institute (T/NI) seeks to alleviate poverty within our lifetime. The Transforming Agriculture for Small Farmers (TASF) program within T/NI aims to double incomes and reduce variability for 10 million smallholder farmers in a financially and environmentally sustainable manner. It aspires to do this through identifying and/or developing innovative interventions and business models and using the vibrant agricultural private sector to scale these solutions.

Smallholder farmers face a host of barriers to increasing income – use of non-scientific practices, high input and labor costs, lack of good market access, etc. But a major consideration is climate – in our earlier research[1], 63% of smallholder farmers cited climate as their top concern and 70% experienced crop loss due to variation in weather. At the same time, agriculture is a major contributor to climate change. It accounts for 18%[2] of greenhouse gas emissions, and this is only going to increase as our population increases, consumption increases and other sources of emissions decrease. It is therefore critical to address the impact of agriculture on climate. Given the financial situation of the smallholder farmer, it is difficult to expect them to change to agricultural practices that may be better for the environment but will reduce their income or have them taking more risk.

TASF's "Agri-IKIGAI" initiative is working on both sides of the climate challenge. To alleviate the impact of farming on climate, it is identifying "Agri-IKIGAI" practices that are good for the environment and the customer and financially beneficial for the farmer. It will use its networks to disseminate these practices to stakeholders that have connects with farmers (e.g., agri tech companies, integrated value chain companies, non-profits, governments). It will also work on scaling these practices by doing pilots in partnership with commercial partners, getting them to start spreading these practices to their networks of farmers and becoming role models for other private sector players to emulate.

1 - As per the Small Farmers Big Opportunities report by The Nudge Institute (Link); 2 - A report on "Cost-effective opportunities for climate change mitigation in Indian agriculture" (Link)

Preface (2/3)

To bring out the impact of climate change on smallholder farmers, it has conducted primary research to understand their perspectives on the issue. It will use its networks to share this among relevant stakeholders (e.g., think tanks, government, civil society, academia) and bring the voice of the smallholder farmer to the forefront. Our hope is that these stakeholders will incorporate the farmer perspective in their work - from intervention and practices development and propagation to policy recommendations.

This report highlights insights gathered by interviewing smallholder farmer households about changes in and impact of climate and environmental changes. To ensure we are bringing the voice of the farmer to the climate conversation, the research team has refrained from drawing inferences from the data and have instead presented it as collected from the farmers. Further, we have not developed recommendations so that different stakeholders can draw inferences in the context of their work and use them to improve farmer outcomes. We are sharing two examples of how stakeholders could consider insights from this research.

Funders

Most smallholder farmers are using more chemicals today compared to five years ago. 76% are using more pesticide and 54% are using more chemical fertilizers. While this does lead to longer term soil degradation (which many farmers are also aware of), chemical usage is also the most common contributing factor among farmers that saw an increase in yield over the last few years. Further, increased use of weedicide significantly decreases the effort on laborious tasks such as weeding which largely falls on women. Thus, climate positive funding considerations must also account for how reduction in usage of chemicals may impact farmer households, including women.

Preface (3/3)

Think tanks and other players influencing policy

There is a clear recognition of soil degradation by all stakeholders and the need to increase organic carbon in the soil. The potential benefits of farmyard manure are well known and often advocated in this context , but unfortunately both the number of smallholder farming households owning cattle/buffaloes and the number of animals they own are decreasing. Hence players influencing policy need to keep these trends in mind as they develop ways to improve soil health.

The TASF team will actively work to disseminate the findings in this report to relevant stakeholders. This will include identifying different groups of relevant stakeholders, using our networks to reach out to such groups and in addition to sharing the findings, encouraging these stakeholders in turn to use and circulate the findings.

Acknowledgements (1/2)

Our partners

We are very grateful to the farmers that provided their time and perspectives and to our partners who supported this research by facilitating the interviews. Our partners helped identify farmers based on set criteria, and translated the interviews when necessary.

Centre for Collective Development

Deshpande Foundation

माण देशी Mann Deshi

Pasidi Panta

SEHGAL FOUNDATION

WOTR Rejuvenating Communities & Ecosystems

WRMS

We are also thankful to Mr Gurulingappa P.H. for facilitating the interviews in Kalaburagi, Karnataka.

Our reviewers

The following individuals reviewed and provided input on the research findings — Vijay Badhani, Devang Bhandari (KPMG), Mohammad Innus (Deshpande Foundation), Sandip Jadhav (WOTR), Krishnaiah Kodimela (Pasidi Panta), Gurulingappa Koppa (Nature Conservation Foundation), and Pawan Kumar (Sehgal Foundation) — and we would like to thank them for their time and input.

Acknowledgements (2/2)

We would like to also acknowledge the ongoing strategic support of KPMG Global Services.

Finally, and most importantly, we would like to express our deepest gratitude to Rituj Sahu and Deepali Khanna of The Rockefeller Foundation. In addition to financially supporting the research, they have been true thought partners - from bringing out the value of "the voice of the smallholder farmer" in the climate conversation to providing input on the design of the project to reviewing findings and pushing our thinking.

Our team
Our team comprised of Puneet Goenka, Shalini Gupta, Rupal Saxena, and Ashish Karamchandani with support from Shruti Soumya.

Target population and research sample

Target population

We interviewed smallholder farmers that

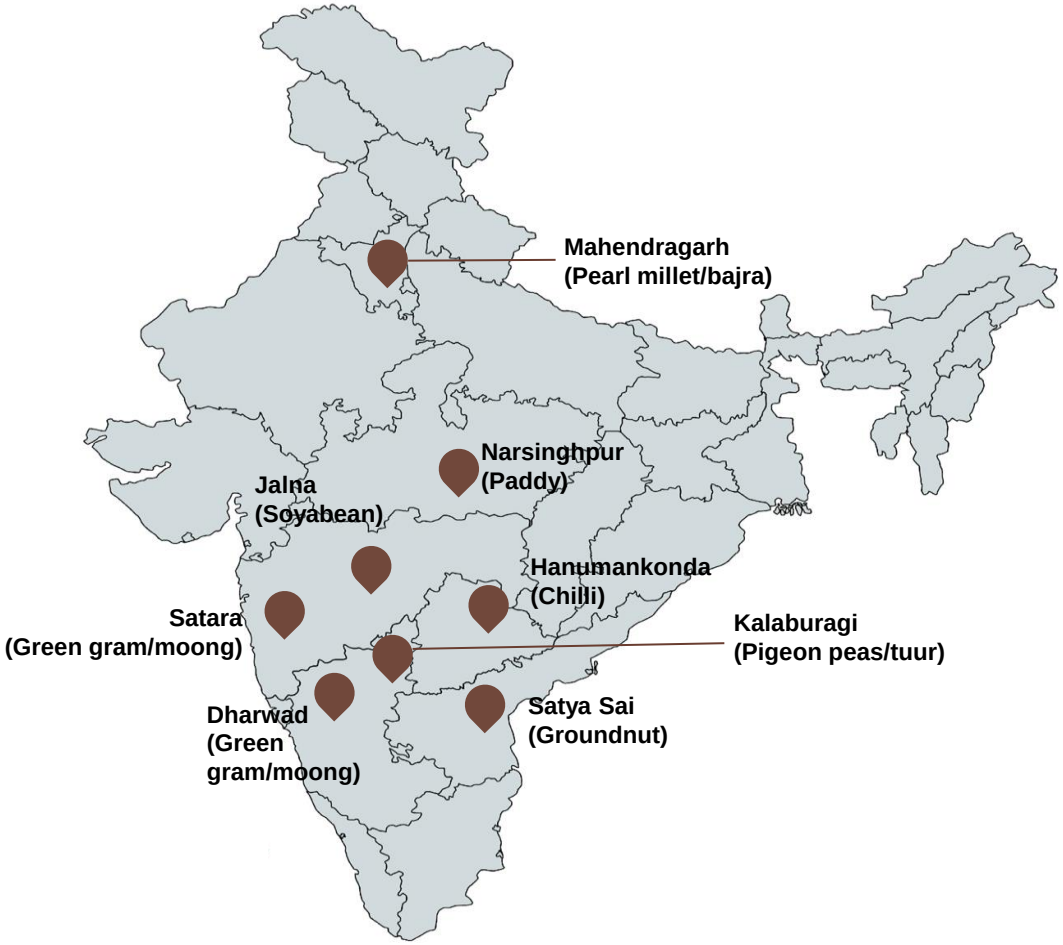
- Owned 1-3 acres of land if irrigated and 3-7 acres if rainfed[1]
- Used farming practices that are typical across the country (e.g., use of pesticides, urea, DAP)
- Typically earned a sizeable proportion of household income from farming
- Typically did not own tractors

Number of interviews and locations

We conducted 145 interviews with farmers that took decisions about their farm (e.g., what to sow, where to sell harvest)[2]

We also conducted 56 interviews with spouses of male farmers. Spouses work on the farm but do not take farming related decisions independently

Interviews were conducted in 8 districts across 6 states and 5 agro-ecological zones



The research is based on a relatively small sample and did not utilize random sampling. Hence, findings may only be directionally indicative and are not intended to be numerically representative of the smallholder farmer population in India

Map of mainland India and location of districts are meant to be indicative. Crops mentioned against each district is the kharif crop that generates the most income for most farmers interviewed in that district. Other crops may also be grown in that district. In some districts (e.g., Hanumankonda) a single crop was grown for most the year (i.e. chilli).
1 - If only a part of the land was irrigated, we conducted the interview either about their irrigated or rainfed land only and classified the farmer as either irrigated or rainfed, there were 6 such interviews. When the research team was unable to make this categorization the farmers were classified as 'partially irrigated' and data for this group was analyzed separately, there were 18 such interviews; 2 - 22 of the 145 interviews were with women that took decisions about their farm

Executive Summary (1/3)

Click on the key finding for supporting slides

Yield[1] for smallholder farmers has not consistently increased or decreased in the last five years – several climatic/environmental factors contribute to this

- Yield decreased for 54%, increased[2] for 35%, and stayed the same for 11% of smallholder farmers

Changes/variability in rainfall and pests/disease are the top challenges for smallholder farmers about their farming

- 75% rainfed farmers cited rain as their top concern; 52% of irrigated farmers cited pests/disease[3]
- 76% rainfed farmers have experienced significant crop loss (at least 50%) and mentioned rain as the primary reason for the loss whereas 55% irrigated farmers have experienced significant crop loss and mentioned rain as the primary reason, closely followed by pests/disease
- Among rainfed farmers whose yield has decreased in the last 5 years, 83% cited rain as the reason while among irrigated farmers whose yield has decreased, 54% cited pests/disease as the reason and 29% cited rain

Incidence of pests, disease, and weeds have increased for about 3 in 4 smallholder farmers in the last five years

- Pests and disease have increased for ~74% farmers and weed have increased for 77% farmers

More than 1 in 2 smallholder farmers are using more chemicals today as compared to five years ago

- On average, incidence of spraying pesticides and usage of chemical fertilizers has more than doubled for 76% and 54% of smallholder farmers respectively
- 48% have started using new categories of chemicals (e.g., weedicide, plant growth hormones) in the last 5 years

Chemical usage in the last five years has had a positive impact for some smallholder farmers

- Among farmers that saw an increase in yield in the last 5 years (35%), 46% farmers attribute this increase to chemical usage
- For farmers that saw an increase in pests[4], 55% were able to keep the increase of pests in check by using pesticide
- For farmers that saw an increase in weeds[5], 76% were able to keep the increase of weeds in check by using weedicide

Based on interviews with 145 smallholder farmers (123 male and 22 female farmers), and 54 spouses of male farmers, across 8 locations. Female farmers not only work on the farm but also take key decisions (e.g., what to sow, where and when to sell harvest). Spouses work on the farm but do not take farming related decisions independently. All references to a change over time is over a five year period. 1 - Refers to yield of main kharif crop. In locations where farmers typically grew only one crop through the year (e.g., chilli) data on yield change was taken for this main crop. 2 - Increase in yield was most prevalent for farmers in 2 of the 8 locations, Soyabean and Moong dal were the main kharif crops in these two locations. 3 - Disaggregated data (by irrigation status, gender, or research location) has been shown in cases where the research team felt there was a significant difference based on that variable. In other cases, only aggregated data has been shown. 4 - Does not include 23% of farmers who cited an increase in pests. 5 - Does not include 35% of farmers who cited an increase in weeds and farmers who did not use weedicide.

Executive Summary (2/3)

Click on the key finding for supporting slides

Almost 3 in 5 smallholder farmers feel soil has worsened and 2 in 5 feel no change in the last five years

- 59% felt their soil fertility had decreased while 37% noticed no change
- 57% of farmers who started using new categories of chemicals (e.g., weedicides) in the last 5 years felt their soil had deteriorated since introducing the chemicals, while 35% did not
- 44% of farmers felt their soil texture had gotten worse, while 46% noticed no change
- 61% of farmers mentioned that earthworms have either decreased or completely vanished in their fields, 28% saw no change

More than 3 in 5 smallholder farmers are aware of and already implementing some practices to improve soil health (e.g., farm yard manure)

- 61% practice crop rotation[1] to improve soil health and/or yield
- 77% use farm manure to improve soil health; of these farmers 39% buy manure or rent sheep indicating that farmers recognize the value of this practice and are willing to pay for it
- At the same time, number of farmers that own cattle is decreasing – 79% owned 5 years ago while 66% own today, and the number of cattle they own is also decreasing - ~4 cattle five years ago while ~3 cattle today

Smallholder farmers are also implementing other practices (e.g., buying hybrid seeds) to increase income

- 64% have changed their seed variety; 39% have changed their crop
- 41% of irrigated farmers use a sprinkler[2] and 14% use drip irrigation
- 43% have started using a tractor

More than 3 in 5 smallholder farmers seek and use rain forecast to plan farming activities[3]

- 74% receive rain forecasts and almost all of them use it to plan farm activities such as when to sow/harvest (64%), when to spray chemicals (47%)
- News (TV/print/radio) and WhatsApp groups/SMS are the most prevalent & preferred sources for rainfall information

Based on interviews with 145 smallholder farmers (123 male and 22 female farmers), and 54 spouses of male farmers, across 8 locations. Female farmers not only work on the farm but also take key decisions (e.g., what to sow, where and when to sell harvest). Spouses work on the farm but do not take farming related decisions independently. All references to a change over time is over a five year period. 1 - Growing one crop during kharif and another during rabi was not considered crop rotation. Swapping the parcel of land on which a crop is grown from one season to the next, or growing a different crop periodically, primarily with the intent of improving soil health and/or yield was considered as crop rotation. 2 - Relatively high usage of sprinkler may be due to all farmers in 2 of the 8 locations using sprinklers. 3 – The high usage of rain forecast was unexpected, refer to Page 36 for details.

Executive Summary (3/3)

Click on the key finding for supporting slides

About 1 in 2 smallholder farmer households (male farmers and spouses) are now spending lesser time in farming as compared to five years ago; about 3 in 5 of them are using this time on other income generating work

- 42% male farmers and 53% spouses are spending less time on farming compared to five years ago. Reasons include:
  - Tractor usage is cited as major reason (59% farmers) for decrease in male farmers' farming time
  - Decreased weeding time (94%) is the main reason for lesser farming time of spouses
- 67% men and 59% of spouses who are spending less time are utilizing the time for other income-generating work (e.g., farm labour work)

Spouses had a similar view as male farmers on most topics[1], except in decision making and reduction in soil fertility

- Male farmers stated taking decisions themselves but 1 in 4 spouses feel they are involved in the decision making
  - Among these spouses, ~50% have never disagreed with their husband while making a 'joint' decision
- Fewer male farmers (55%) than spouses (74%) feel that fertility of soil has gone down
- Both male farmers and spouses feel that rainfall is top concern: 52% and 50%; Pests, diseases seen as a concern by more spouses than male farmers

Female farmers had similar views as male farmers on top concerns & impact of climate on agriculture, but had a different perspective on some farming practices

- 52% male farmers & 55% female farmers have mentioned rainfall as top concern; 44% male farmers & 45% female farmers mentioned worse soil texture in last 5 years
- Only 45% female farmers mentioned change in seed as compared to 68% male farmers; 40% female farmers mentioned that they practice crop rotation while this was 65% for male farmers

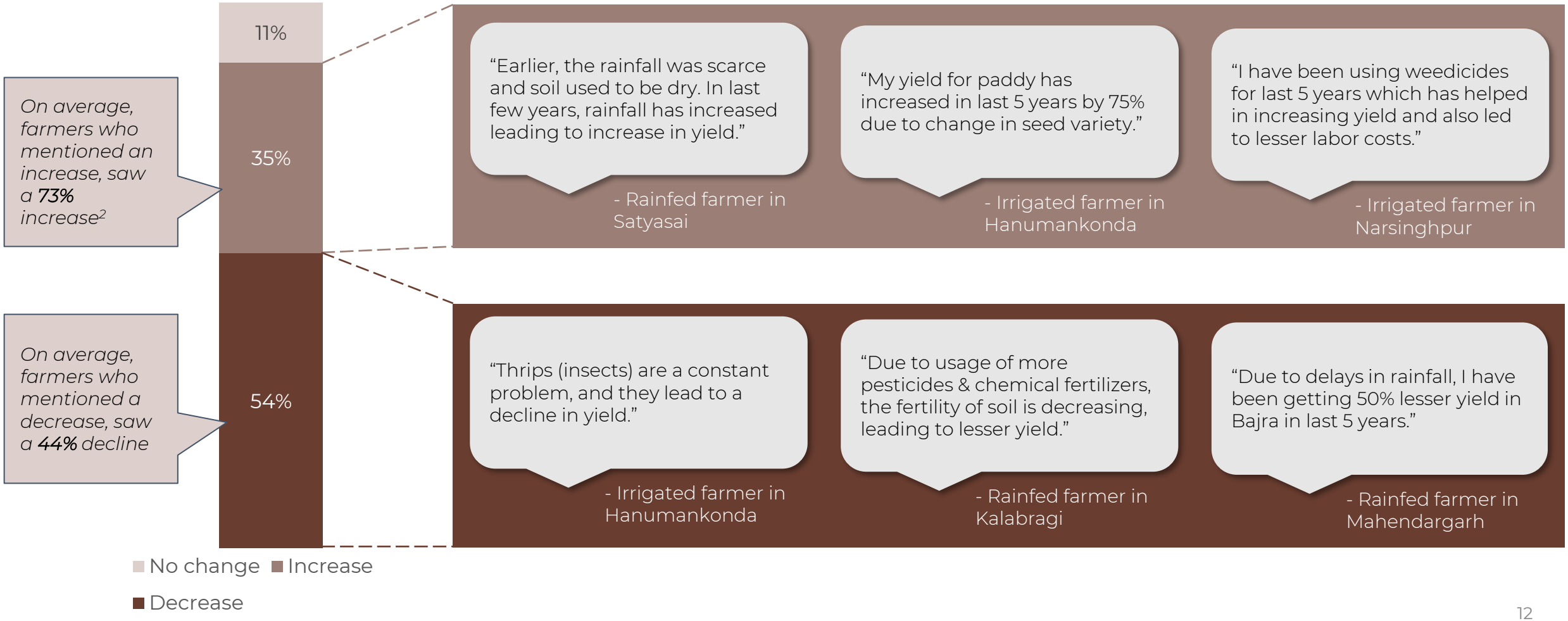
Based on interviews with 145 smallholder farmers (123 male and 22 female farmers), and 54 spouses of male farmers, across 8 locations. Female farmers not only work on the farm but also take key decisions (e.g., what to sow, where and when to sell harvest). Spouses work on the farm but do not take farming related decisions independently. All references to a change over time is over a five year period. 1 - Spouses were asked questions on a subset of topics on which they were more likely to have a point of view. Refer to the learnings section in the appendix to understand the types of questions spouses were unable to answer during pilot interviews.

Yield for smallholder farmers has not consistently increased or decreased in the last five years – several climatic/environmental factors contribute to this

"My yield of chilli has dropped by more than 50% in last 5 years, because more rainfall has led to more diseases and fruit dropping"

Yield for smallholder farmers has not consistently increased or decreased in the last 5 years – several climatic/environmental factors contribute to this

Change in Yield[1] in last 5 years



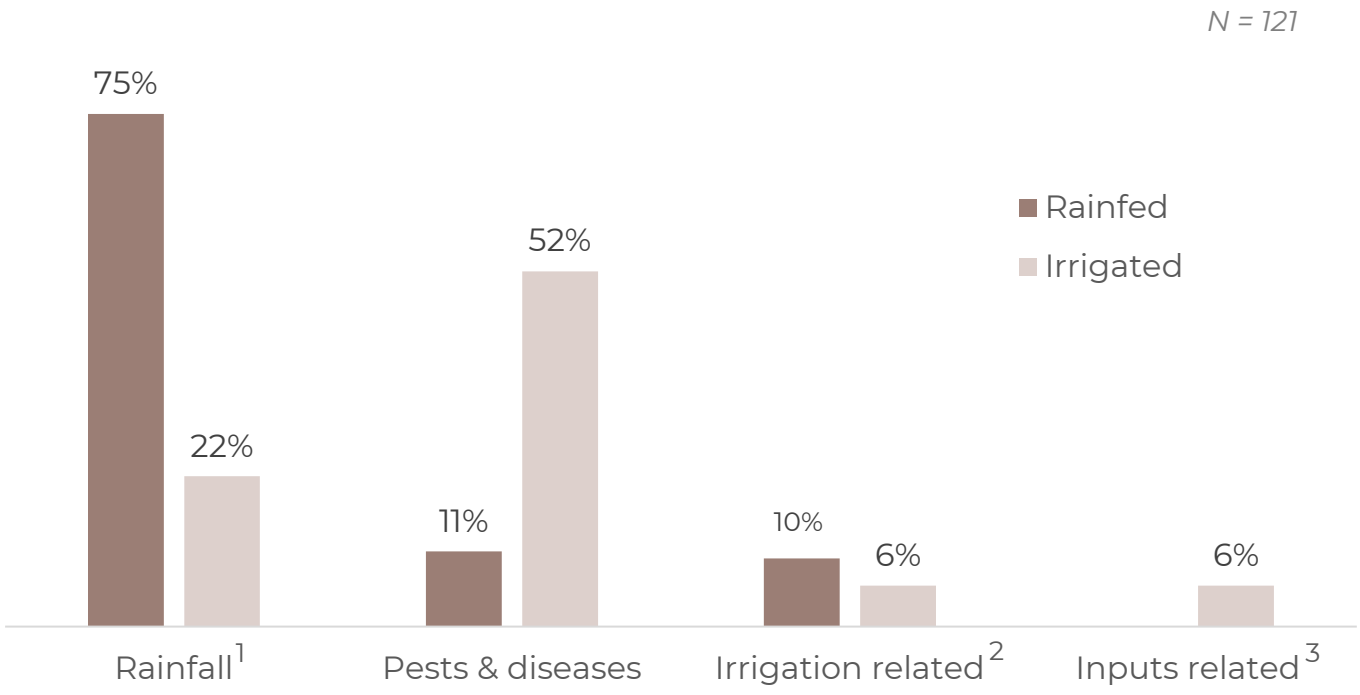
1 – Refers to yield of main kharif crop. In locations where farmers typically grew only one crop through the year (e.g., chilli) data on yield change was taken for this main crop. 2 - Increase in yield was most prevalent for farmers in 2 of the 8 locations, Soyabean and Moong dal were the main kharif crops in these two locations.

Changes/variability in rainfall and pests/disease are the top challenges for smallholder farmers about their farming

> *"Rainfall is a top concern for me in agriculture. Last year, it rained during the harvesting season and damaged 50% of my crop"*

75% rainfed farmers cited rain as their top concern; 52% of irrigated farmers cited pests/disease

Top concerns in agriculture by irrigation status of small farmer



63% farmers cited an increase in unseasonal rain in the last 5 years.
Among farmers that cited rain related aspects as their top concern, 41% stated unseasonal rain

"Unseasonal rainfall is the biggest problem. Sometimes it does not rain around the sowing season and rains during the harvest. This impacts the yield."

- Rainfed farmer in Jalna

"Rain is very unpredictable and so the yield is very variable."

- Rainfed farmer in Satara

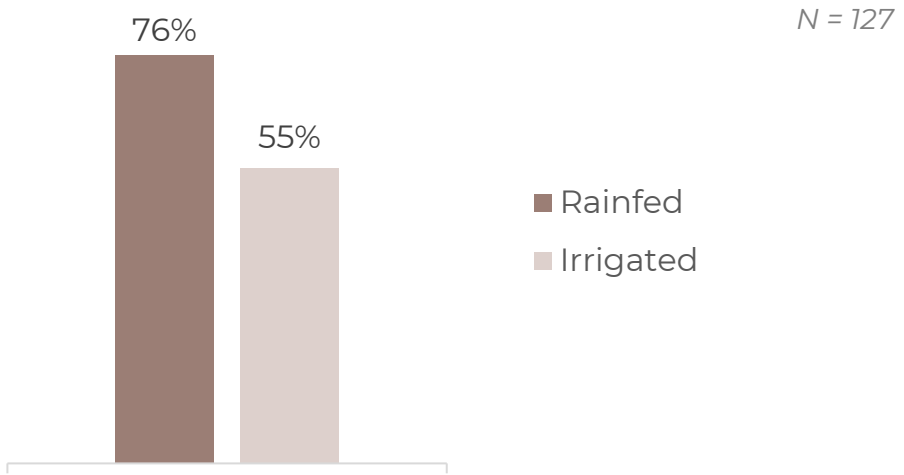
"I am most challenged by the increase in disease in wheat, rice, and moong crop. I do not know why it is happening but it is leading to crop losses."

- Irrigated farmer in Narsinghpur

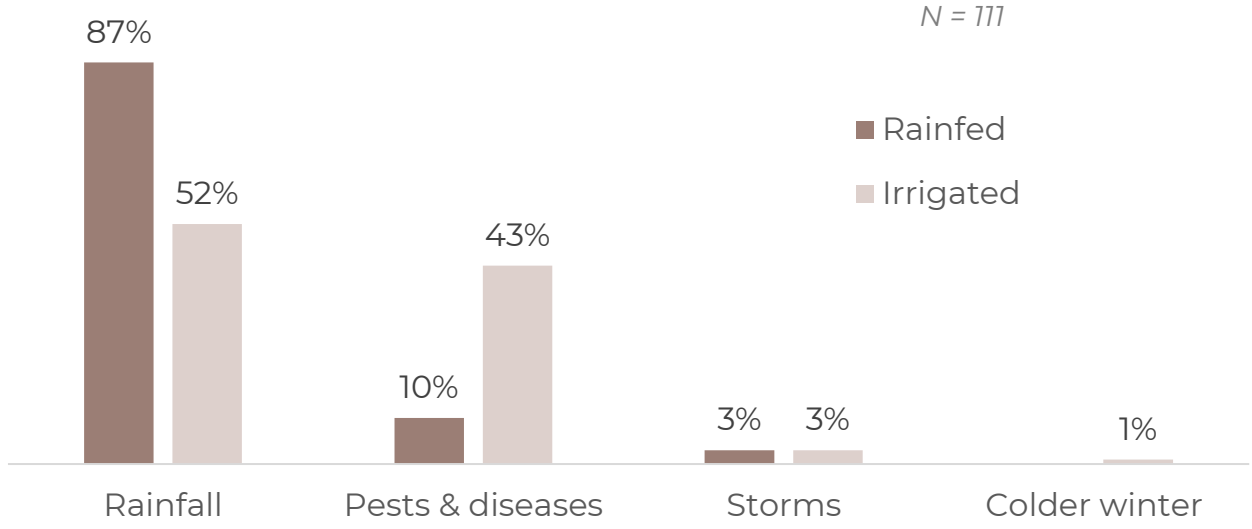
1 - Includes various challenges related to rain such as too little/too much rain during the season, variability during the season, unseasonal rain (i.e., late onset or rain during harvest).
2 - Includes responses such as no irrigation, shortage of electricity for irrigation. 3 - Includes responses such as timely availability and prices of inputs

Rainfall was cited as the biggest reason for crop loss by all farmers; For irrigated farmers, pests and diseases also contributes significantly to crop loss

% of smallholder farmers that experienced significant crop loss[1] at least once in last 3 years, by irrigation status



Reason for most recent crop loss, by irrigation status



Farmers that had significant crop loss experienced it (on average) on 88% of their land and 1.9 times in the last 3 years

"I witnessed more rainfall between flowering and harvesting stage which damaged the crop."

- Rainfed farmer in Dharwad

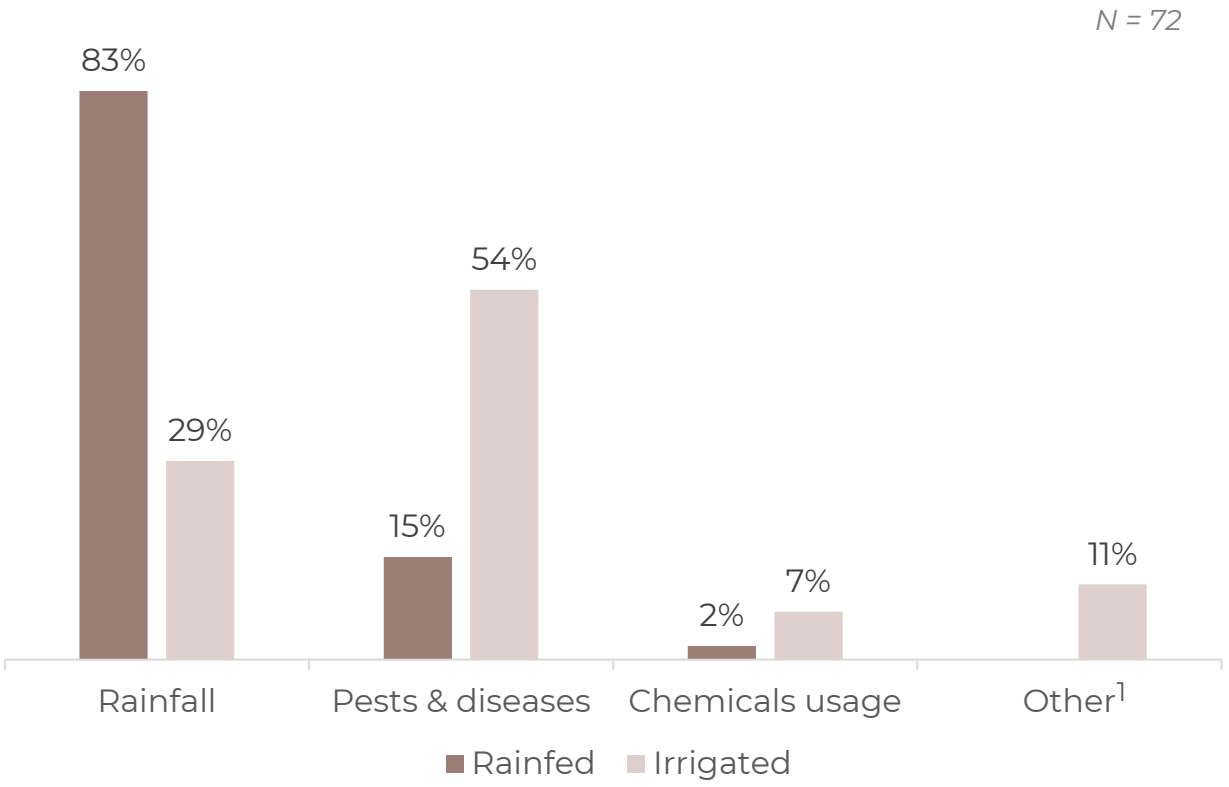
"There was unseasonal rainfall during the harvest season. I had already cut the crop, but then it rained and destroyed all of it."

- Irrigated farmer in Narsinghpur

1 - Significant crop loss: Loss of more than 50% crop.

Among rainfed farmers whose yield decreased, 83% cited rain as the reason while among irrigated farmers, 54% cited pests/disease as the reason and 29% cited rain

Reason for decrease in yield in last 5 years by irrigation status



"Delay in rainfall has led to decline in yield of bajra from 8 Qt/acre to 4 Qt/acre in last 5 years."

- Rainfed farmer in Mahendargarh

"Unseasonal rainfall during harvest time has led to 30% decline in yield as compared to yield 5 years ago."

- Rainfed farmer in Dharwad

"Thrips has impacted the yield negatively, reducing it to less than half of the yield 5 years ago."

- Irrigated farmer in Hanumankonda

1 - Includes responses such as delay in availability of inputs, lesser fertility of soil

Incidence of pests, disease, and weeds have increased for about 3 in 4 smallholder farmers in the last five years

> *"Pests have increased in my field in last 3 years because of rainfall"*

Pests and disease have increased for ~74% farmers and weeds have increased for 77% farmers

Pests have increased for 74% farmers

N = 141

"Western thrips have increased a lot. It is not a native pest to India and so none of the existing chemicals and medicines work well against it."

- Irrigated farmer in Hanumankonda

"Pests have increased in my field, maybe due to environmental reasons. This has led me to spraying more pesticides to keep them in check."

- Rainfed farmer in Dharwad

"Pests have increased the most in soyabean due to cloudy weather and more rainfall."

- Irrigated farmer in Jalna

Disease has increased for 73% farmers

N = 141

"I have seen disease increase in 5 years. Some parts of the plant get a virus which leads to lesser plant growth."

- Rainfed farmer in Satyasai

"Disease in crops have increased in the last 5-6 years due to higher moisture content in the soil."

- Irrigated farmer in Hanumankonda

"My crop gets a fungal disease which has increased in the last 5 years, and sometimes it does not go away even after using chemicals and medicines."

- Rainfed farmer in Narsinghpur

Weeds have increased for 77% farmers

N = 141

"Weeds have increased in last 5 years because bags of seeds and fertilizers are adulterated with seeds of weeds."

- Irrigated farmer in Dharwad

"Weeds have increased due to more rainfall, but I am able to keep them in check with weedicide."

- Irrigated farmer in Satara

"Weeds have increased in bajra due to more rainfall, but I don't use weedicide. I use labor for weeding."

- Rainfed farmer in Mahendargarh

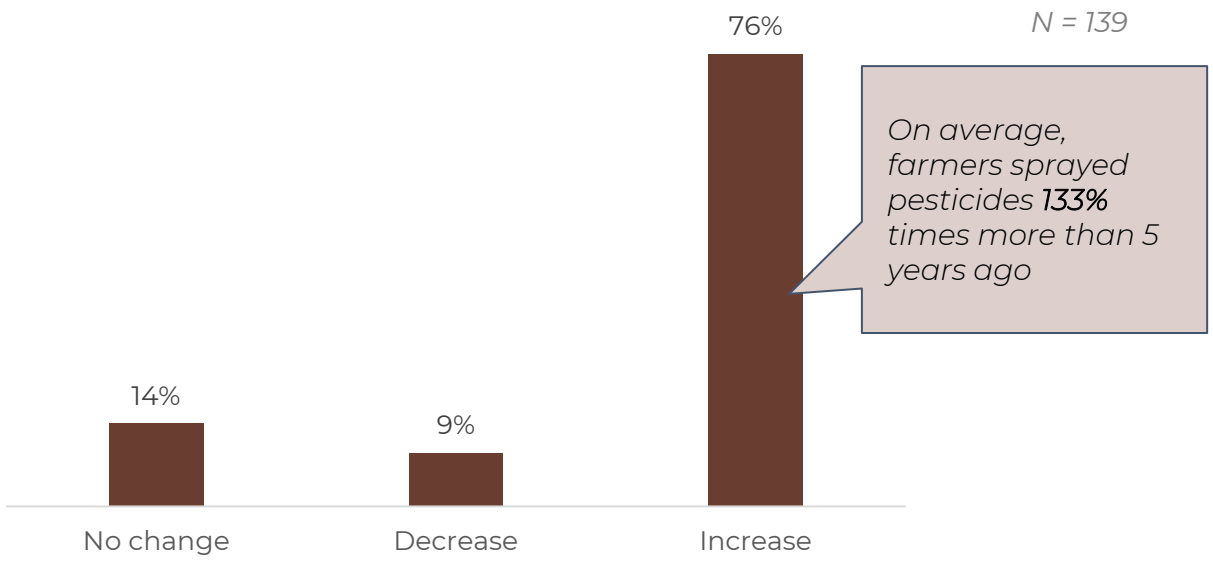
Some farmers linked increase in pests and disease to variations in rain

More than 1 in 2 smallholder farmers are using more chemicals today as compared to five years ago

> *"I used to spray pesticides 1-2 times in a season, but now I spray 3 times. I also used to put 1 bag of DAP earlier, but now I have to put 2 bags of DAP"*

On average, incidence of spraying pesticides and usage of chemical fertilizers has more than doubled for 76% and 54% of smallholder farmers respectively

Change in no. of times pesticides are sprayed per acre as compared to 5 years ago



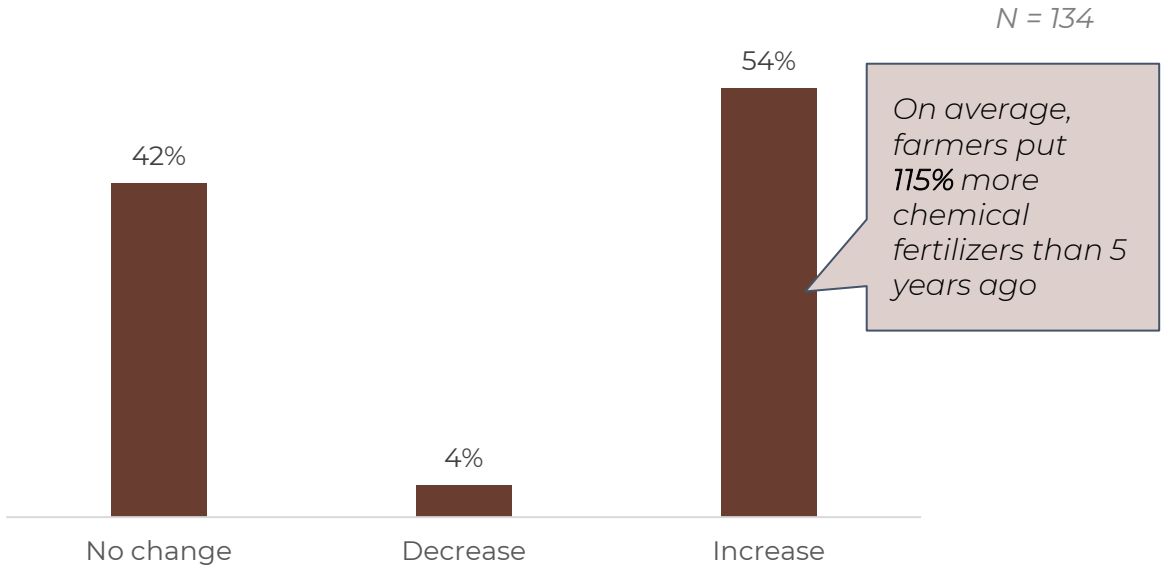
"Earlier I used to spray twice in a season, but now I need to spray 4 times."

- Rainfed farmer in Satyasai

"Due to increase in pests, I have increased spraying from 3 sprays earlier, to 5 sprays now."

- Rainfed farmer in Dharwad

Change in no. of bags of chemical fertilizers used per acre as compared to 5 years ago



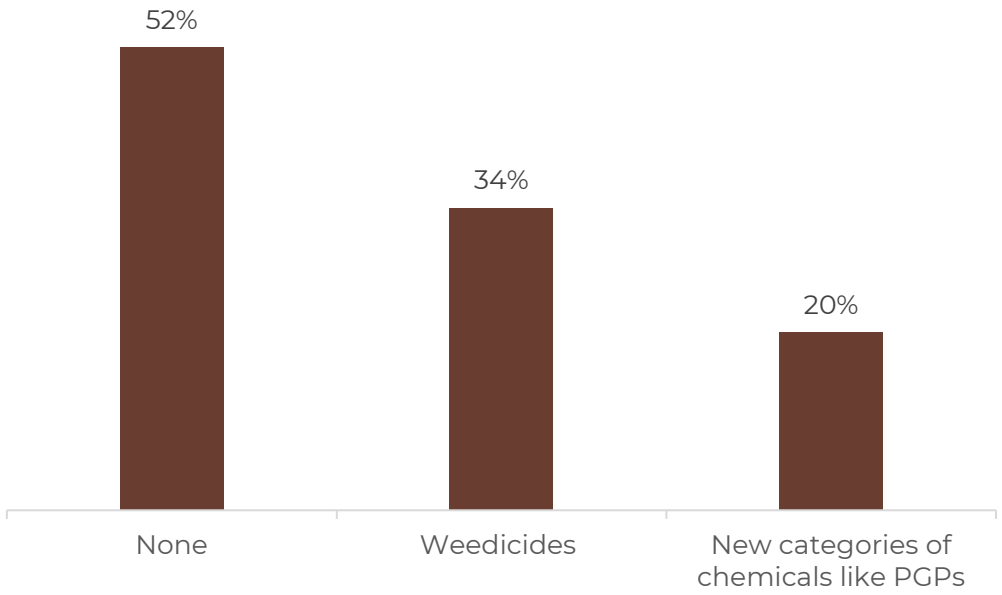
"I have to put more number of bags of chemical fertilizers in chilli now because I don't use farm yard manure, so more chemicals are required to offset the reduction in soil fertility in last few years."

- Irrigated farmer in Hanumankonda

48% have started using new categories of chemicals (e.g., weedicide, plant growth hormones) in the last 5 years

Usage of new categories of chemicals like weedicides and Plant Growth Promoters (PGPs) in last 5 years

N = 132



"I have been using plant growth promoter and flowering agents twice in a season for last 3 years."

- Rainfed farmer in Satyasai

"I have started using 5 kg of Zinc and Potash for one acre of paddy field."

- Irrigated farmer in Narsinghpur

"I have started using weedicide and plant growth promoters, both twice in a season of chilli."

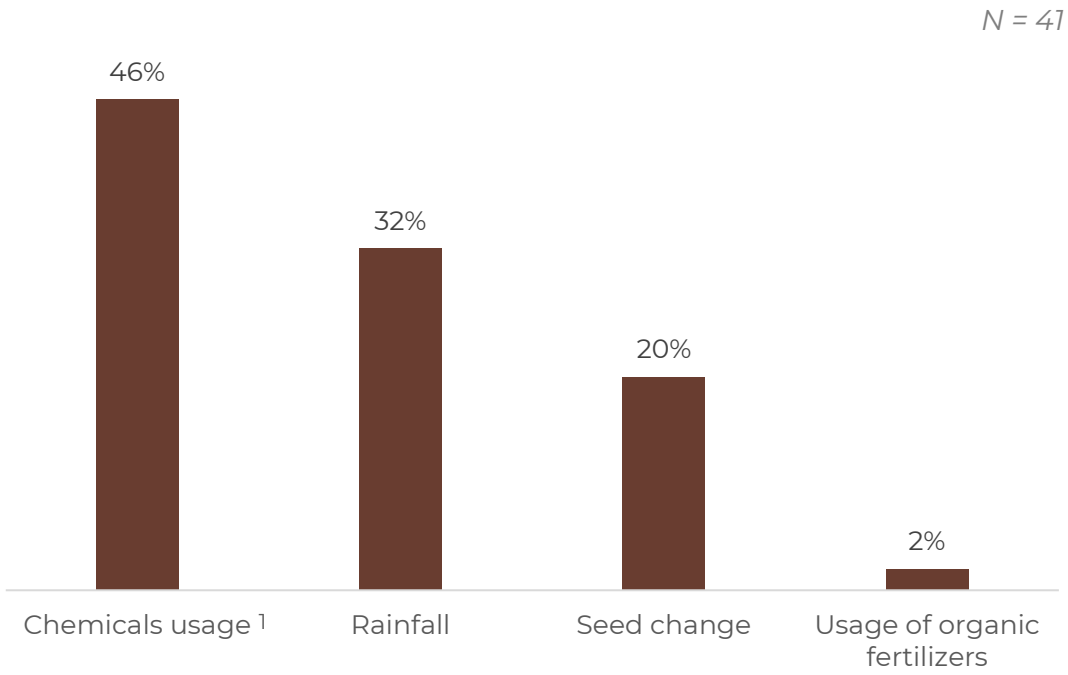
- Rainfed farmer in Dharwad

Chemical usage in the last five years has had a positive impact for some smallholder farmers

“I started using weedicides 4 years ago due to which I have been getting a better yield and have less dependence on labor for weed removal”

Among farmers that saw an increase in yield in the last 5 years (35%), 46% farmers attribute this increase to chemical usage

Reasons for increase in yield in last 5 years



"I feel that quality of sprays and chemicals have improved and this leads to more yield."

- Irrigated farmer in Narsinghpur

"I have been using more Urea and DAP in the last few years which has led to a huge increase in yield of bajra."

- Rainfed farmer in Mahendargarh

"I have been using more chemical fertilizers and plant growth promoters, which has more than double the yield of green gram in last 5 years."

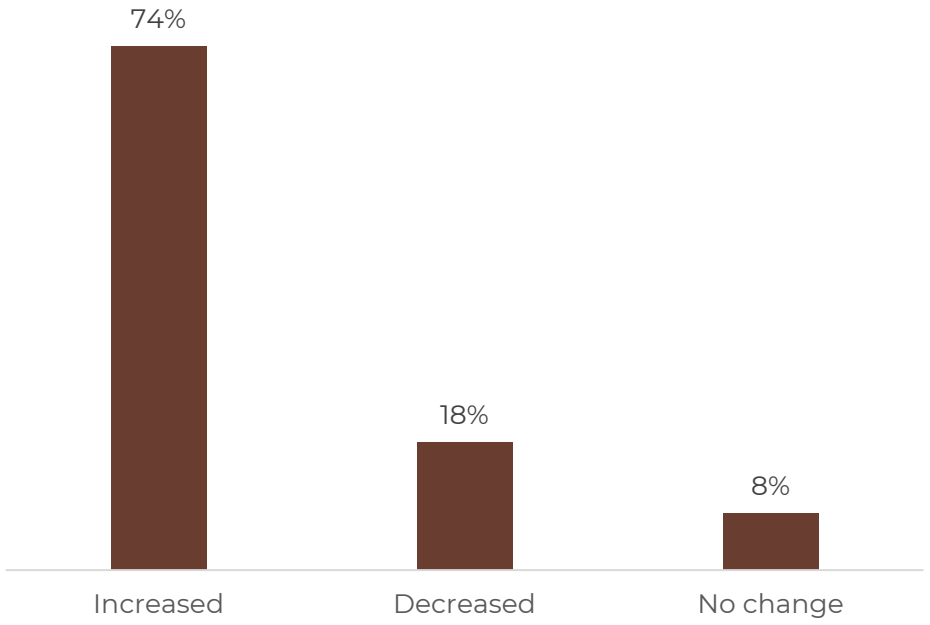
- Rainfed farmer in Dharwad

1 - Includes increase in chemicals, improvement in quality of chemicals or weedicide usage

74% farmers saw an increase in **pests**; For farmers that saw an increase[1], 55% were able to keep pests in check using **pesticides**

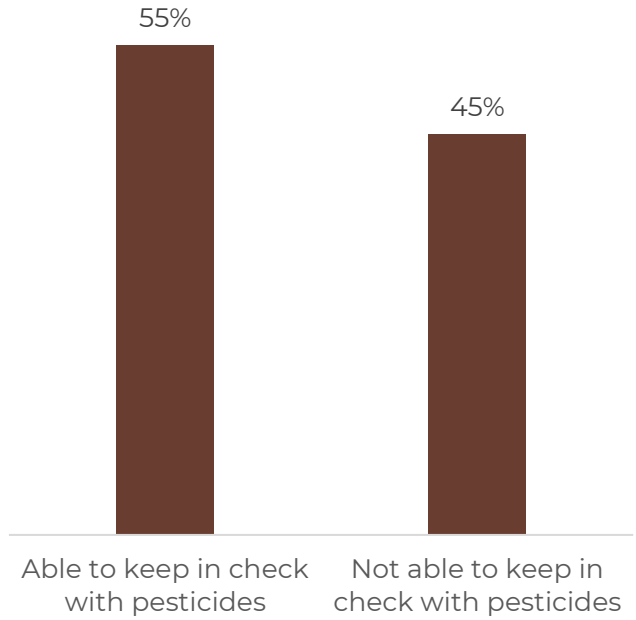
Changes seen by farmers in number of pests in last 5 years

N = 141



% of farmers (that saw an increase in pests) that were able to keep increased pests in check using pesticides

N = 80[1]

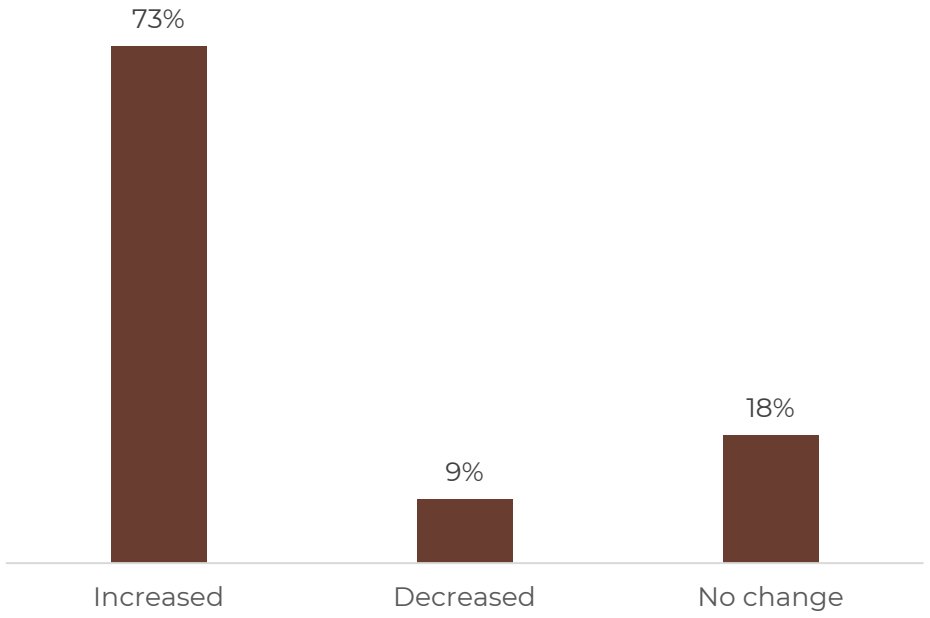


1 – The question of whether pests were in check with usage of pesticide was not asked to 23% of farmers that reported an increase in pests. Farmers for whom this data is not available is a random group and are not concentrated to specific research locations

73% farmers saw an increase in **disease**; For farmers that saw an increase[1], 46% were able to keep pests in check using **chemicals**

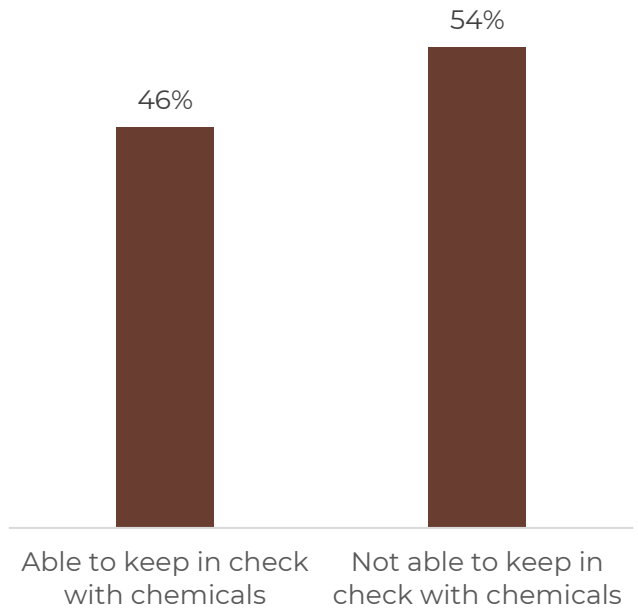
Changes seen by farmers in disease in last 5 years

N = 141



% of farmers (that saw an increase in disease) that were able to keep increased disease in check using chemicals

N = 73[1]

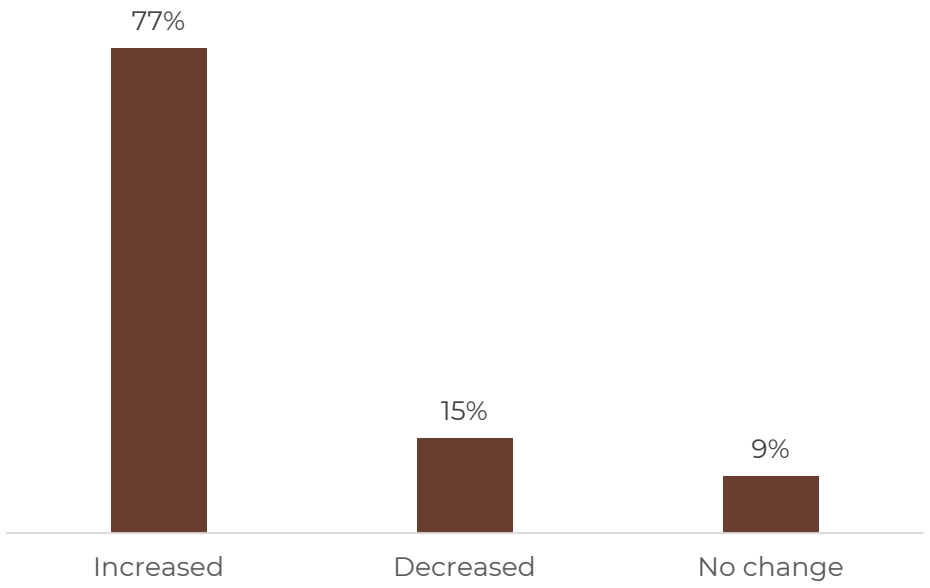


1 – The question of whether disease was in check with usage of chemicals was not asked to 21% of farmers that reported an increase in disease. Farmers for whom this data is not available is a random group and are not concentrated to specific research locations

77% saw an increase in **weeds**; For farmers that saw an increase[1], 76% were able to keep weeds in check using **weedicides**

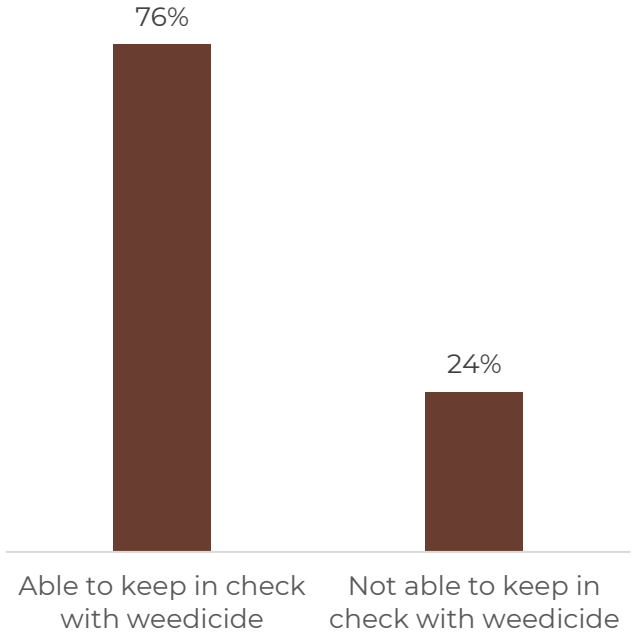
Changes seen by farmers in number of weeds in last 5 years

N = 141



% of farmers (that saw an increase in weeds and use weedicide) that were able to keep increased weeds in check using weedicides

N = 71[1]



Weedicide usage was common in all but one research locations

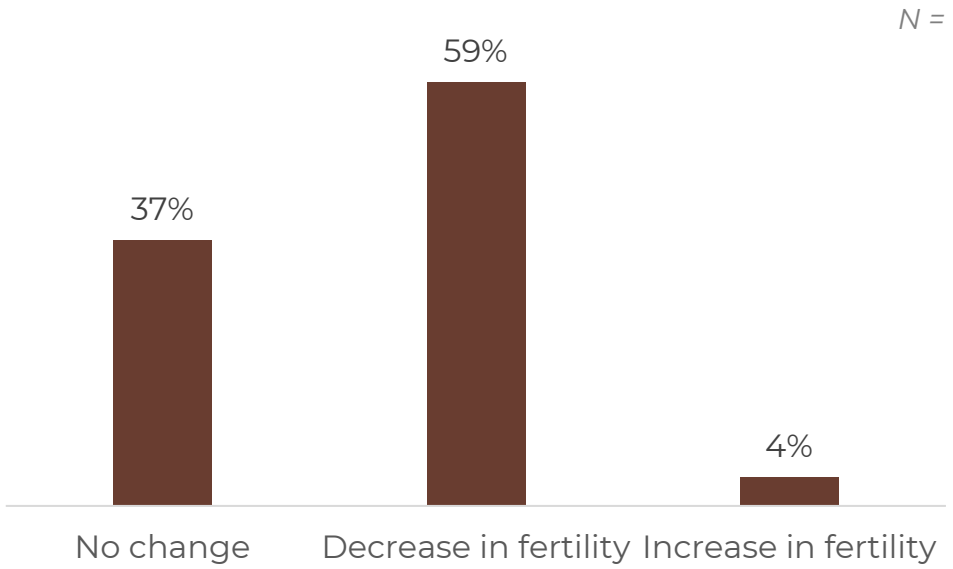
Summation of individual percentages in the graph do not add up to 100% because of rounding. 1 – The question of whether weeds were in check with usage of weedicide was not asked to 35% of farmers that reported an increase in weeds (or some of them did not use weedicide). Apart from farmers in Satya Sai district who did not use weedicides, farmers for whom this data is not available is a random group and are not concentrated to specific research locations

Almost 3 in 5 smallholder farmers feel soil has worsened and 2 in 5 feel no change in the last five years

“The land is harder and has a white tinge. Microbes have also reduced leading to lower fertility. I feel all this is a result of increased chemical usage”

59% felt their soil fertility had decreased while 37% noticed no change; 44% of farmers felt their soil texture had gotten worse, while 46% noticed no change

Farmers' perception on change in soil fertility in last 5 years[1]



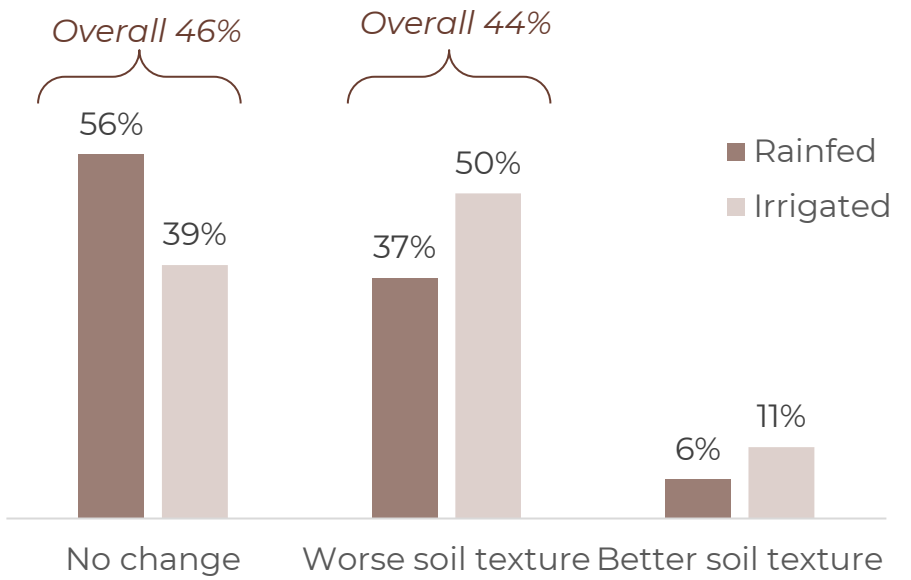
"I get my soil tested every year for free and as per the results, there is no change in fertility of soil."

- Irrigated farmer in Hanumankonda

"I feel that soil fertility has gone down in last 5 years due to increased usage of pesticides and chemicals."

- Irrigated farmer in Satara

Farmers' perception on change in soil texture in last 5 years



"I have not seen any change in soil texture in my field. It has always been red, loamy."

- Rainfed farmer In Satyasai

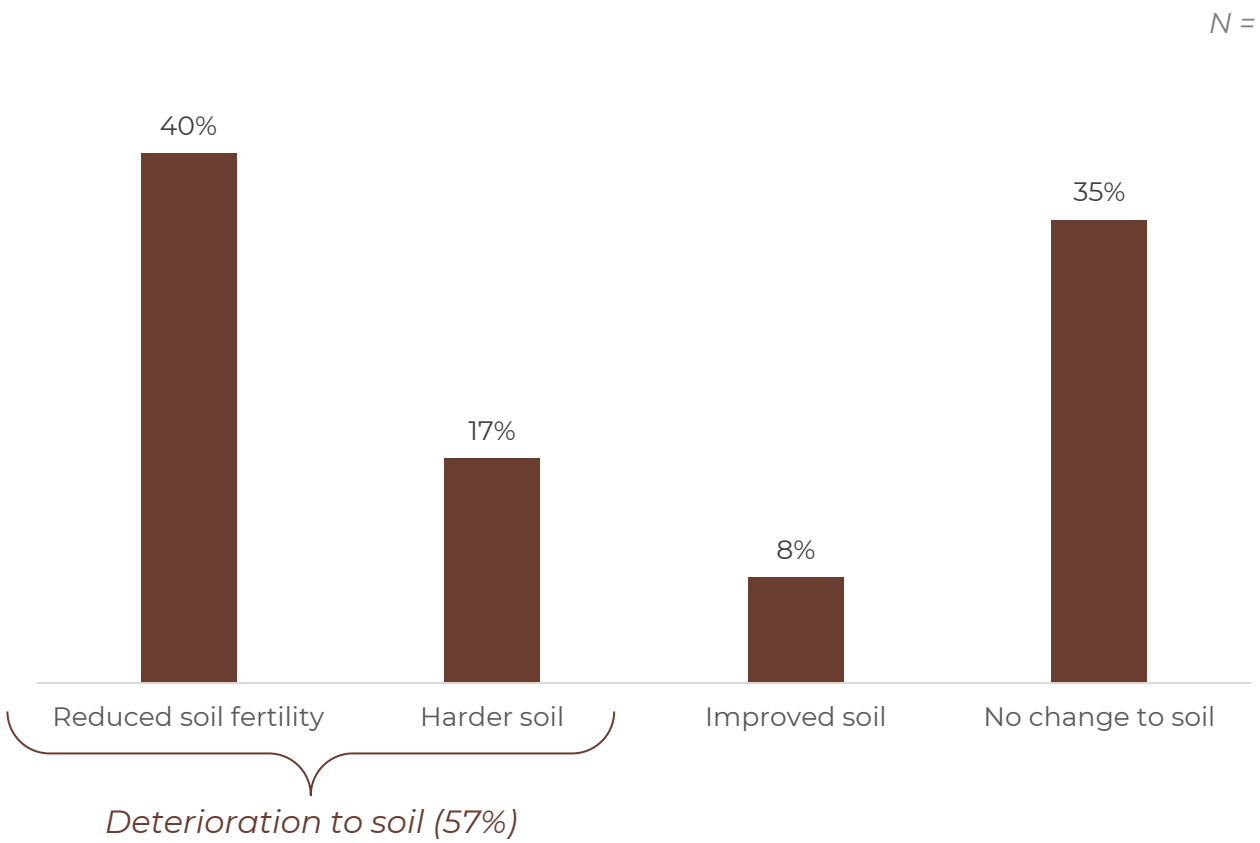
"I think the soil is getting harder because there is no irrigation, hence no moisture available for soil."

- Rainfed farmer in Mahendargarh

1 – No distinction is shown on irrigation status because the numbers are very similar – 59% rainfed and 61% irrigated farmers mentioned decrease in fertility.

57% of farmers who started using new category of chemicals[1] (e.g., weedicides) felt their soil had deteriorated since introducing the chemicals, while 35% did not

Perception of chemical usage on their soil for farmers who started using new category of chemicals[1] in the last 5 years



"I feel that the land is getting infertile, but I have to still use weedicide because of shortage of labor."

- Irrigated farmer in Warangal

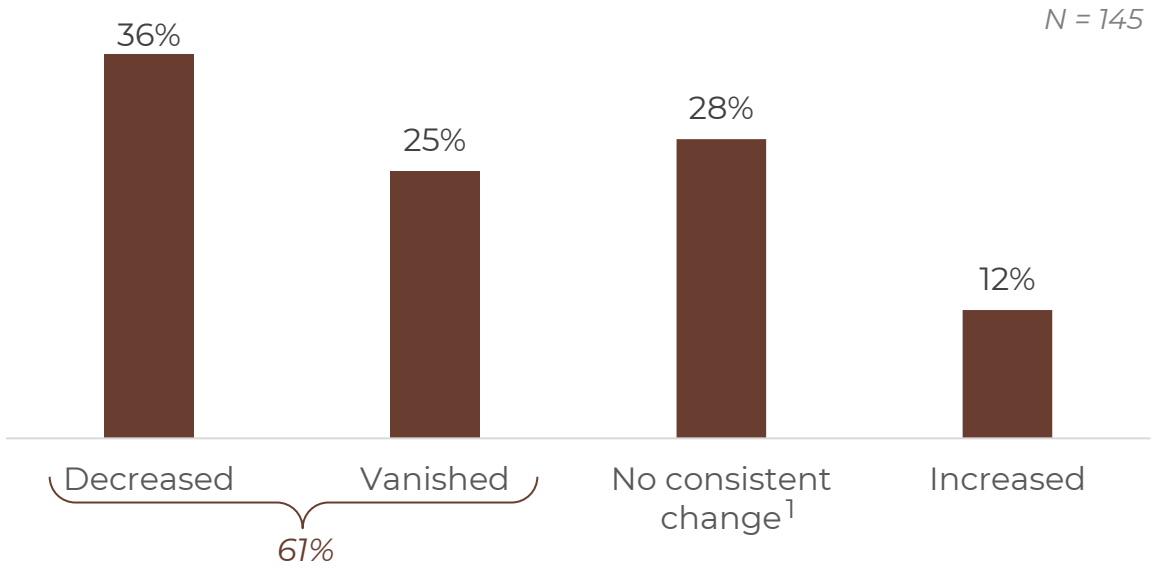
"There is no impact on soil due to the chemicals. There is a boundary on my farm that prevents washing off soil to other fields, hence the fertility is intact."

- Rainfed farmer in Dharwad

Respondent photo taken with consent by research team. Photo is used for representational purposes only. 1 – Chemicals apart from pesticides and fertilizers (e.g., weedicide, plant growth promoters)

61% of farmers mentioned that earthworms have either decreased or completely vanished in their fields, 28% saw no change

Farmers' perception on change in amount of earthworms in their soil in last 5 years



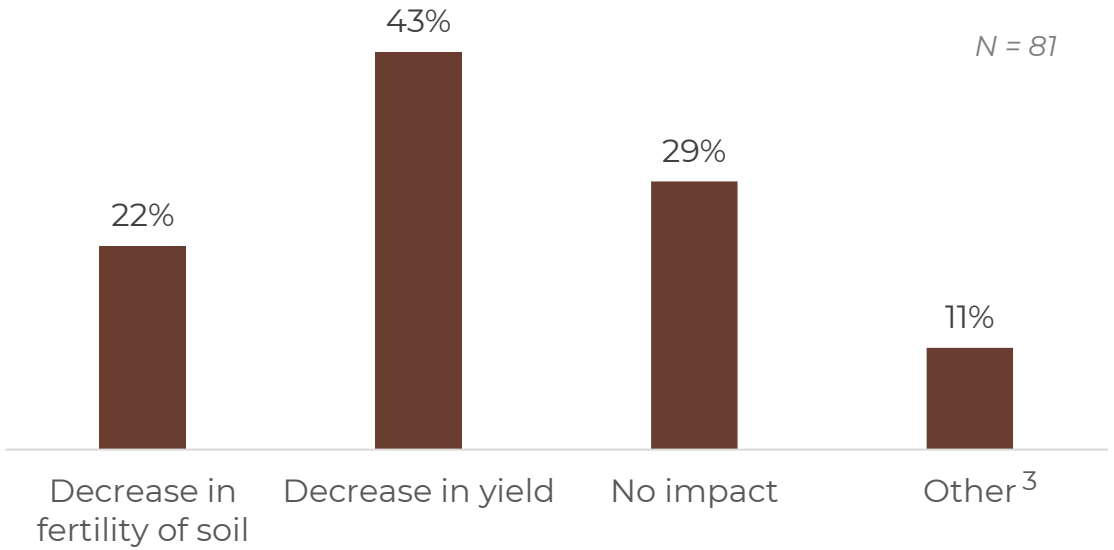
"Number of earthworms in my soil has reduced significantly due to increased usage of pesticides."

- Irrigated farmer in Hanumankonda

"There has been no change in number of earthworms because there were no earthworms 5 years ago, and no earthworms still."

- Rainfed farmer in Mahendargarh

Impact of decreased or vanished earthworms in farming by farmers who mentioned these changes[2]



"Decreased earthworms has impacted soil health because earthworms are not able to decompose the organic matter & give nutrients to soil."

- Irrigated farmer in Hanumankonda

"Lower amount of earthworms in soil has made it tighter and leads to lesser crop yield."

- Irrigated farmer In Narsinghpur

1 - No change could also mean that worms were absent even 5 years ago. 2 – Total of all % is more than 100% because some farmers had mentioned more than one impact.
3 – Includes responses such as soil requires more water, and soil requires more fertilizers

More than 3 in 5 smallholder farmers are aware of and already implementing some practices to improve soil health (e.g., farmyard manure)

"I rotate paddy on my field with sugarcane and moong for better yield. I also buy manure to improve soil health"

61% practice crop rotation to improve soil health and/or yield; 77% use farm manure to improve soil health; of these 23% buy manure

61% farmers practice crop rotation[1]

N = 93

"I grow chilli and cotton every alternate year in the kharif season to improve the soil quality."

- Irrigated farmer in Hanumankonda

"Every 2 years, I put Jowar instead of Tuur, because if I grow same crop every year, I won't get a good yield consistently."

- Rainfed farmer in Kalaburagi

77% farmers use manure to improve soil health

N = 94

"Every year, I put manure on 1 acre out of 4 acres of my field since I have limited amount of manure from my cattle. So, all parts of land get manure once in 4 years."

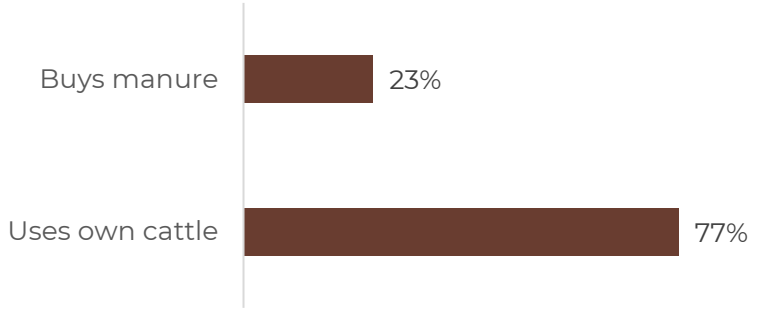
- Rainfed farmer in Mahendargarh

"I use my own cattle's manure for the soil. I collect and store the extra unused manure and am able to use it even 2-3 years later."

- Irrigated farmer in Narsinghpur

Sources of manure[2]

N = 63

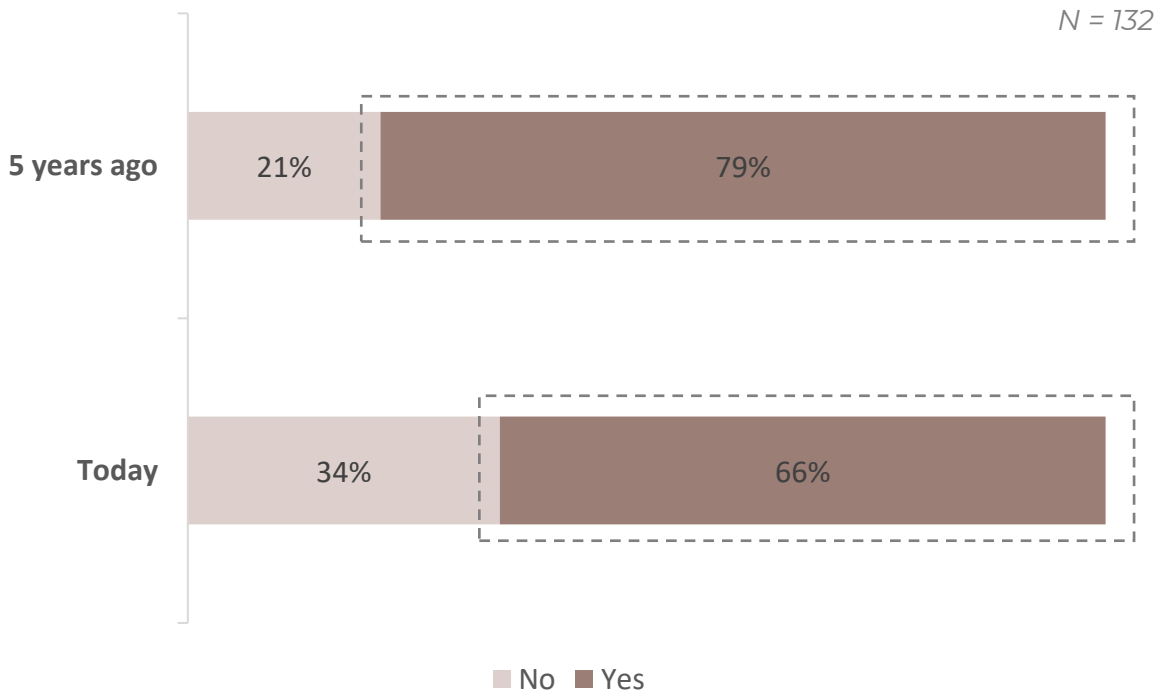


Some farmers are willing to pay for manure indicating that they may recognize the value of it

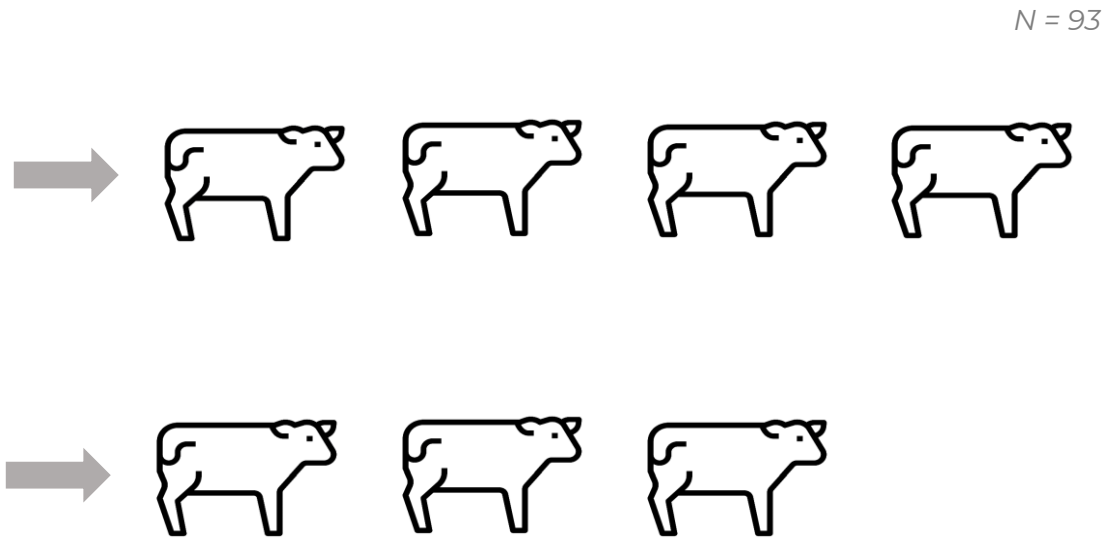
. 1 - Growing one crop during kharif and another during rabi was not considered crop rotation. Swapping the parcel of land on which a crop is grown from one season to the next, or growing a different crop periodically, primarily with the intent of improving soil health and/or yield was considered as crop rotation. 2 – Excludes data from one research location since farmers would rent sheep in this location and use their manure, a practice that was not observed in any of the other research locations

Number of farmers that own cattle is decreasing and the number of cattle they own is also decreasing

Percent of smallholder farmers that own cattle[1], by time period



Average number of cattle owned, by time period



I had 5 cattle earlier, and I sold 3 of them because earlier, my kids helped with the upkeep but now they have moved out, so I and my wife cannot manage so many cattle."

- Rainfed farmer in Mahendargarh

In last 5 years, I sold 1 of the 4 cattle that I had, because I don't have enough money to feed the cattle."

- Irrigated farmer in Dharwad

Decreasing cattle ownership may inhibit future usage of farmyard manure

. 1 - Cattle includes cows, buffaloes, bullocks

Smallholder farmers are also implementing other practices (e.g., buying hybrid seeds) to increase income

> *"In the last few years, I changed the seed variety of paddy that attracts lesser pests than before. This has helped me in getting better yield"*

Many farmers are implementing practices like change in crop (39%), change in seed variety (64%) for better yield and to prevent pests & diseases

Practices

	To increase yield	To prevent pest/disease damage
Crop change | 39% *N = 142*	"I switched from growing jowar to soyabean, because I was getting lesser yield and lower market prices for jowar." - Rainfed farmer in Jalna	"I used to grow chilli and onion, but now I have started growing bengal gram and green gram to reduce pests & diseases attack on the crops." - Rainfed farmer in Dharwad
Seed variety change | 64% *N = 138*	"I earlier used JS335 variety for soyabean, but now I use *Phulesangam* because it gives me more yield." - Irrigated farmer in Jalna	"I have changed the seed variety of *tuur* to get more yield, as the new variety is more resistant to diseases." - Rainfed farmer in Kalaburagi

Many farmers are using technology to save resources & time, like usage of sprinkler, drip and tractors

41% of irrigated farmers use a sprinkler & 14% use drip irrigation

N = 66

"I have been using a sprinkler for last 30 years."

- Irrigated farmer in Mahendargarh who grows bajra

"I have been using drip from 2017."

- Irrigated farmer in Hanumankonda who grows chilli

43% have started using a tractor

N = 72

"I started using tractor for ploughing a few years ago. Earlier I did ploughing of 7 acres in 2 days, but now it takes 4 hours only."

- Rainfed farmer in Satyasai who grows paddy

"I have recently switched to tractor and now instead of 6 hours to plough one acre, it just takes me 1.5 hours."

- Irrigated farmer in Narsinghpur who grows paddy

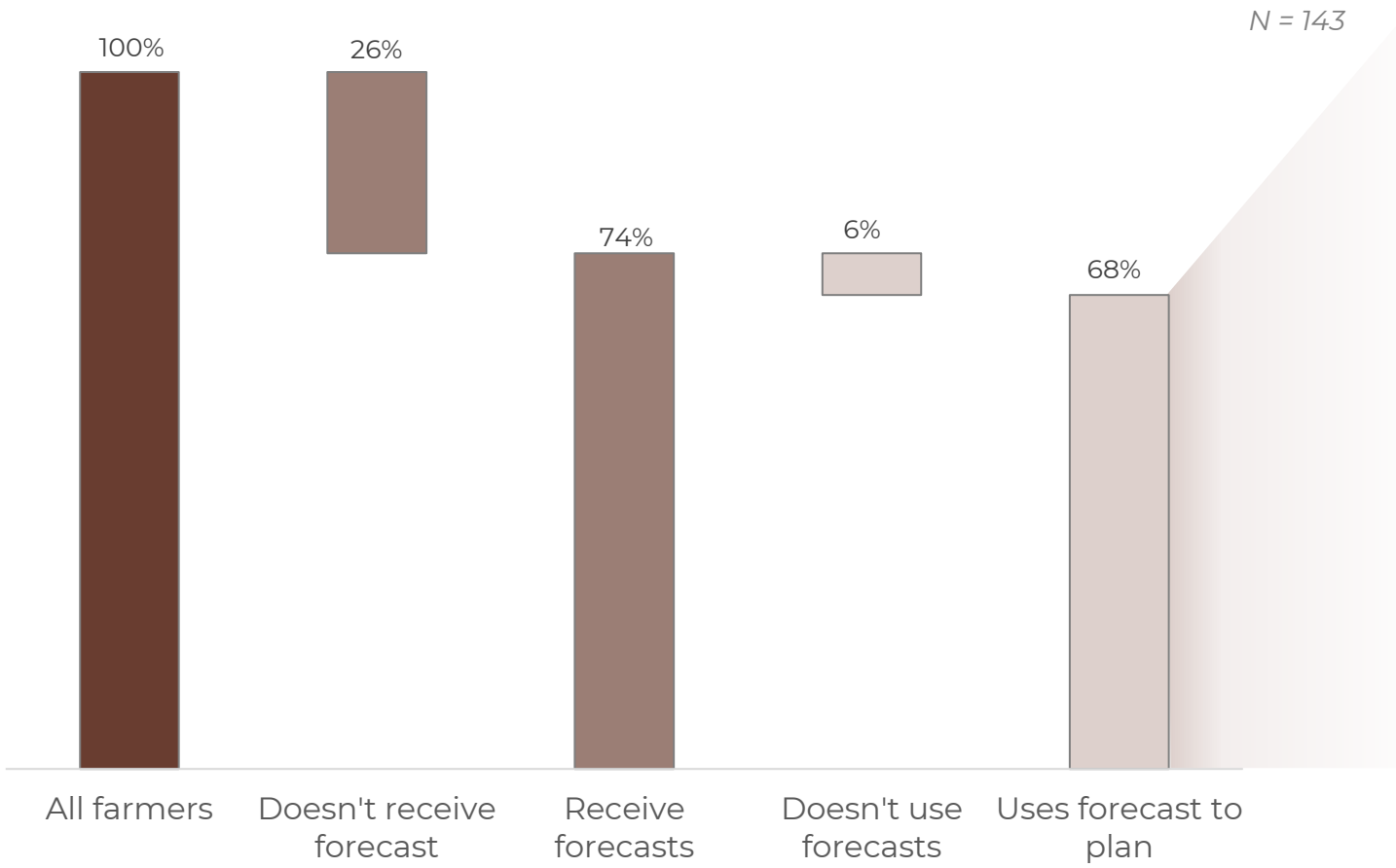
Respondent photo taken with consent by research team. Photo is used for representational purposes only.

More than 3 in 5 smallholder farmers seek and use rain forecast to plan farming activities

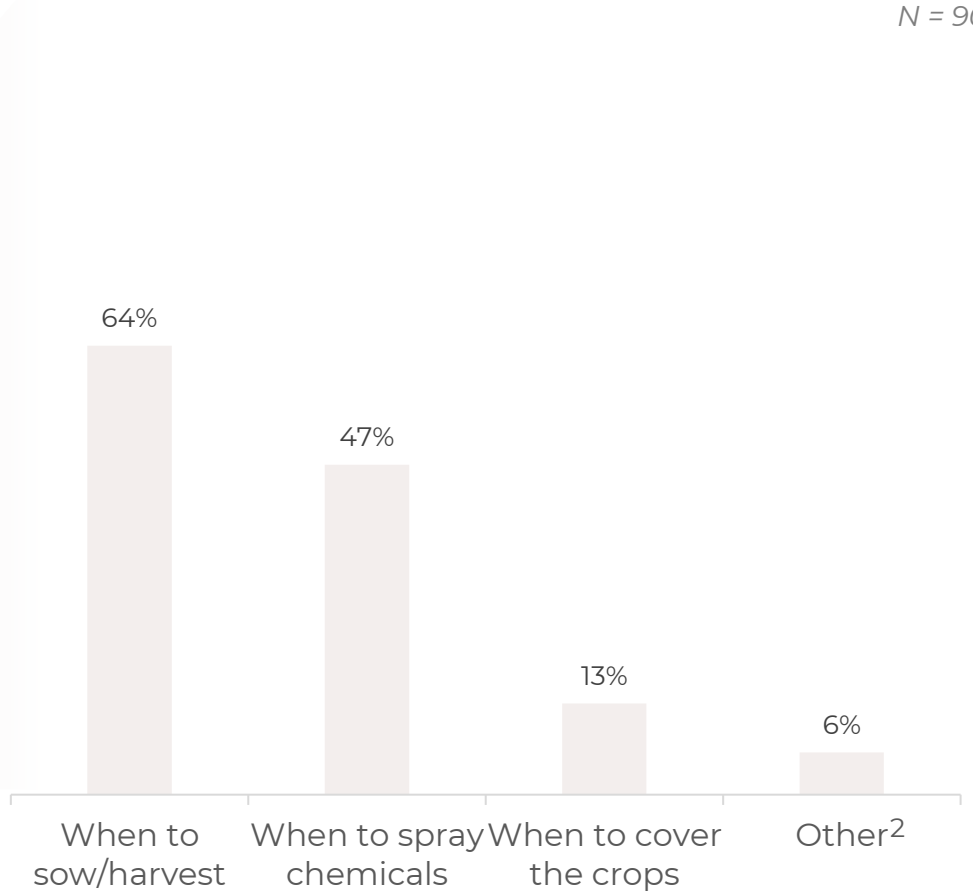
"I get regular rainfall information from News & WhatsApp groups that I use to plan the right time to spray pesticides and apply fertilizers"

74% receive rain forecasts and almost all of them use it to plan farm activities such as when to sow/harvest (64%), when to spray chemicals (47%)

% of farmers who receive and use rainfall forecasts to plan farm activities



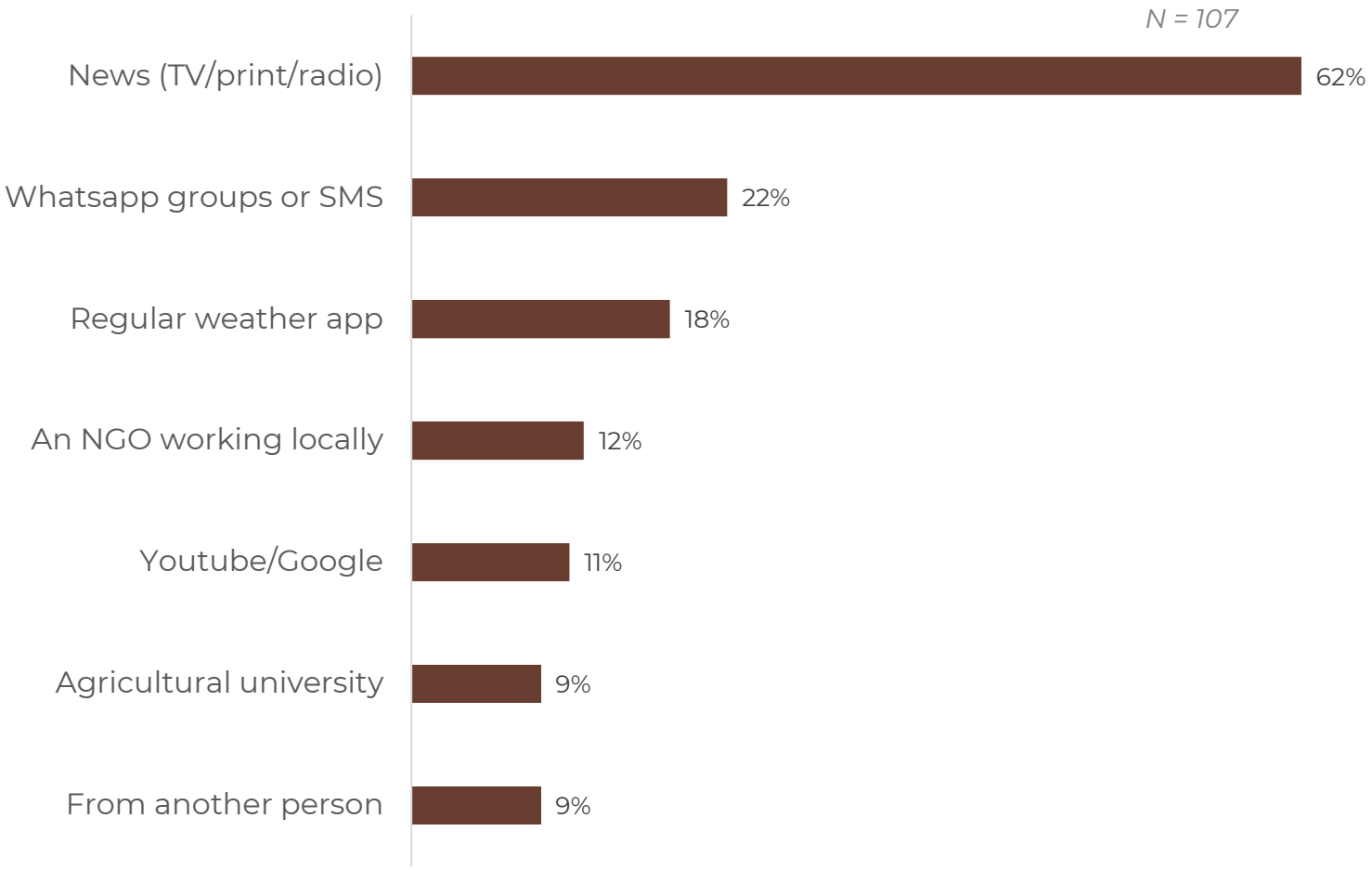
How farmers use rainfall forecast information[1]



1 - Since the percentage of farmers that used rain forecast information was higher than our expectation, we also crosschecked the data with local field teams in a couple research locations to check that the data was aligned with their qualitiative assessment. 2 - Includes responses such as putting lesser or no water in crops

News (TV/print/radio) and WhatsApp groups/SMS are the most prevalent & preferred sources for rainfall information

Most prevalant sources of rainfall information (upto two sources)



"I get information on Punjabdakh Whatsapp group as well as DD news. I prefer Punjabdakh information."

- Rainfed farmer in Jalna

"I get information from TV news and Youtube, but I prefer news because I feel that it is given by experts, unlike Youtube where anyone shares information."

- Rainfed farmer in Dharwad

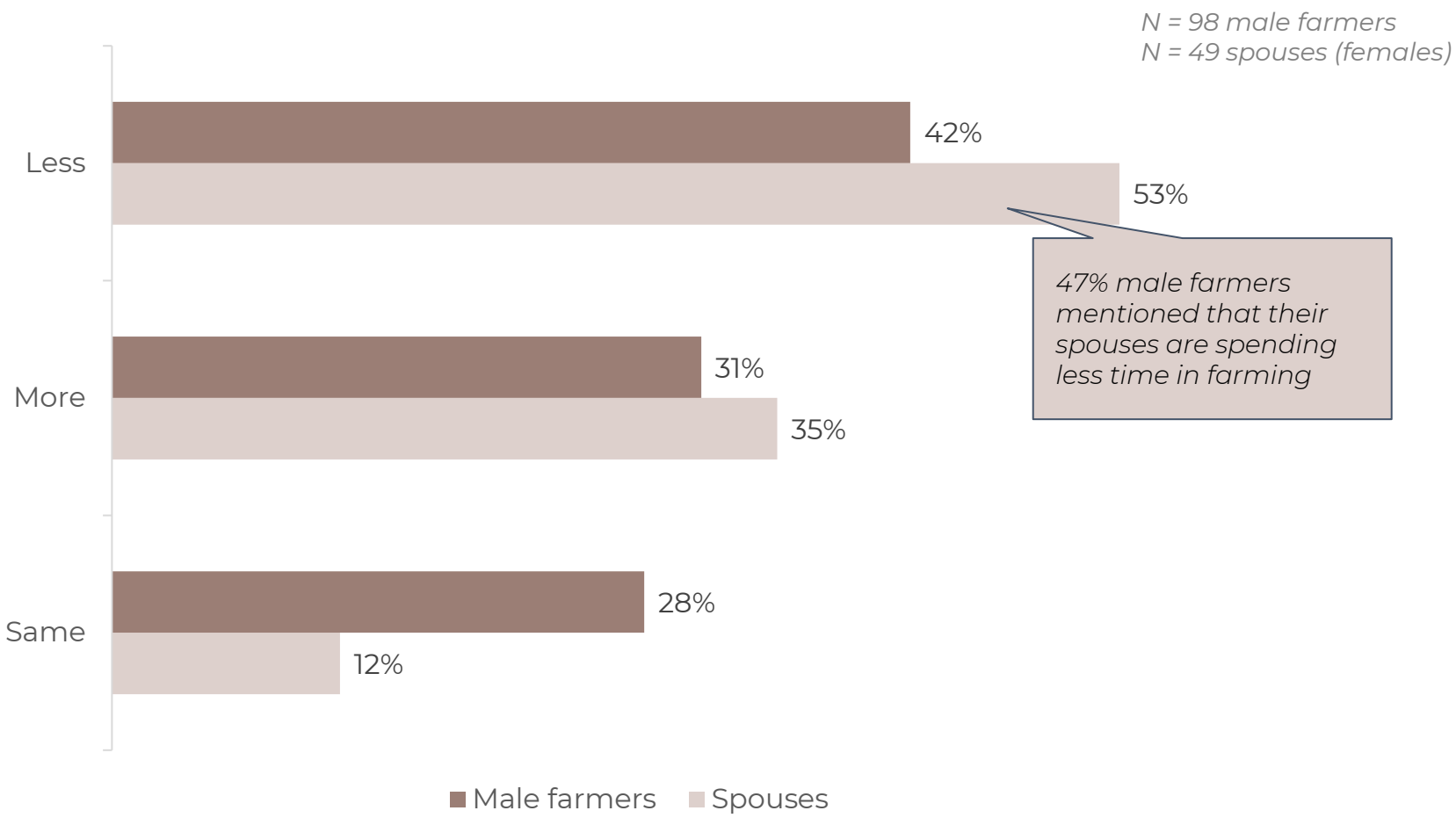
*Among the **37%** farmers that used multiple sources of rainfall information, **31%** preferred News (TV/print/radio), **31%** preferred WhatsApp groups or SMS, **11%** preferred regular weather app.*

About 1 in 2 smallholder farmer households (male farmers and spouses) are now spending lesser time in farming as compared to five years ago; about 3 in 5 of them are using this time on other income generating work

"5 years ago, I ploughed with bullocks, and it took 10 hours to plough one acre of field. Now, I am using tractors and it takes only 1 hour to complete one acre"

42% male farmers and 53% spouses are spending less time on farming overall

Change in overall time spent in farming by male farmers and spouses[1] in last 5 years



"I am spending lesser time in ploughing due to tractor usage, and in harvesting due to usage of harvesting machine. Hence, my overall farming time has reduced."

- Male farmer in Hanumankonda

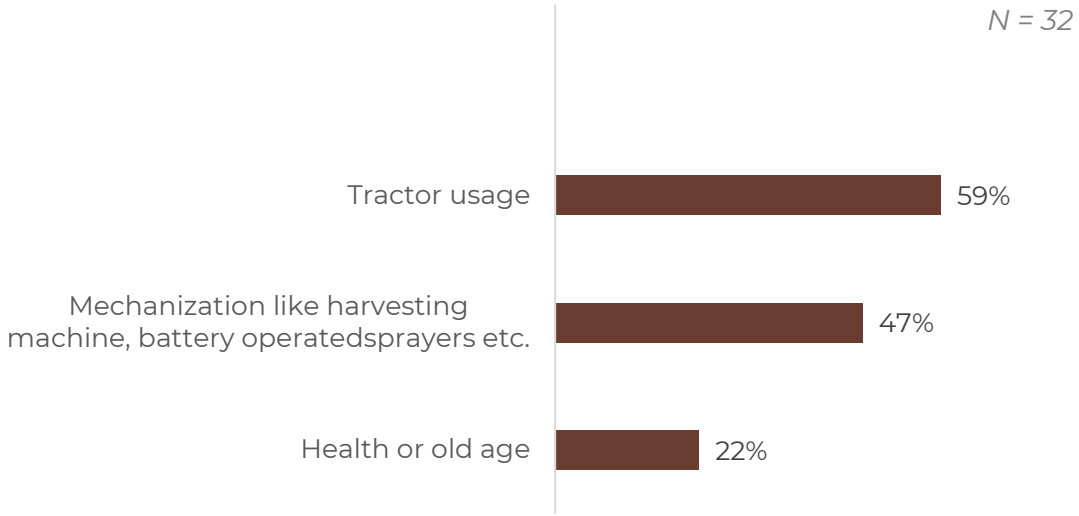
"I am spending lesser time in weeding due to weedicide usage, and also on other activities due to usage of machinery."

- Spouse in Narsinghpur

. 1 - Spouses may not be spouses of the male farmers interviewed

Tractor usage is cited as major reason for decrease in male farmers' farming time; Decreased weeding time is the main reason for lesser farming time of spouses

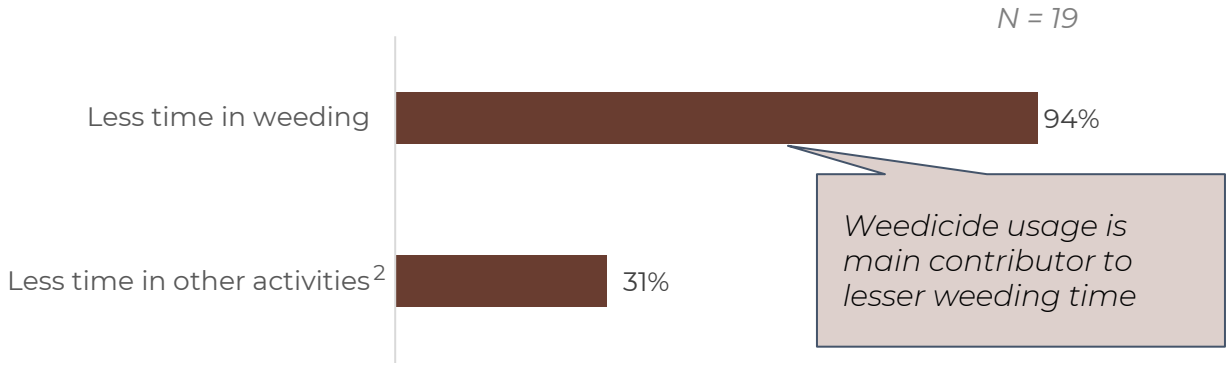
Reasons for decrease in farming time of male farmers in last 5 years



"5 years ago, I used to spend a week in ploughing one acre, but now it takes me only 1.5 days to plough with a tractor."

- Male farmer in Satyasai

Reasons for decrease in farming time of spouses[1] in last 5 years



"Earlier, I spent 10-15 days in manual weeding of 1 acre, but now because of weedicide, I am able to complete 1 acre within 2 hours."

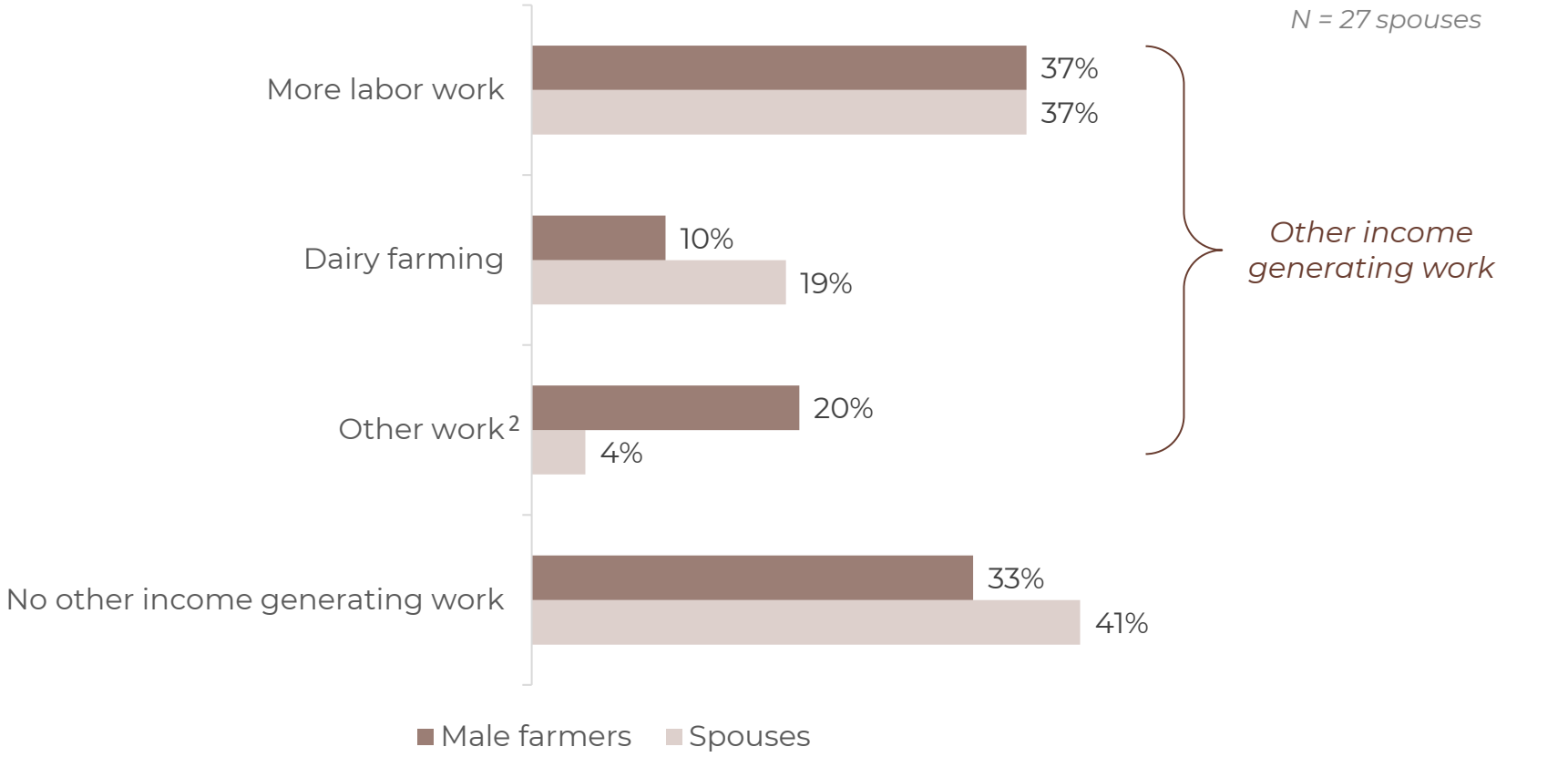
- Spouse in Narsinghpur

. 1 - Spouses may not be spouses of the male farmers interviewed. 2 - Includes harvesting, spraying pesticides etc.

67% male farmers and 59% of spouses who are spending less time are utilizing the time for other income-generating work (e.g., farm labour work)

How male farmers and the spouses[1] are utilizing the extra time from less farming work

N = 51 male farmers
N = 27 spouses



"I have taken up some porter work in the market area as I now have more time available."

- Male farmer in Hanumankonda

"I now take up more labor work in other people's farms because of having extra time."

- Spouse in Narsinghpur

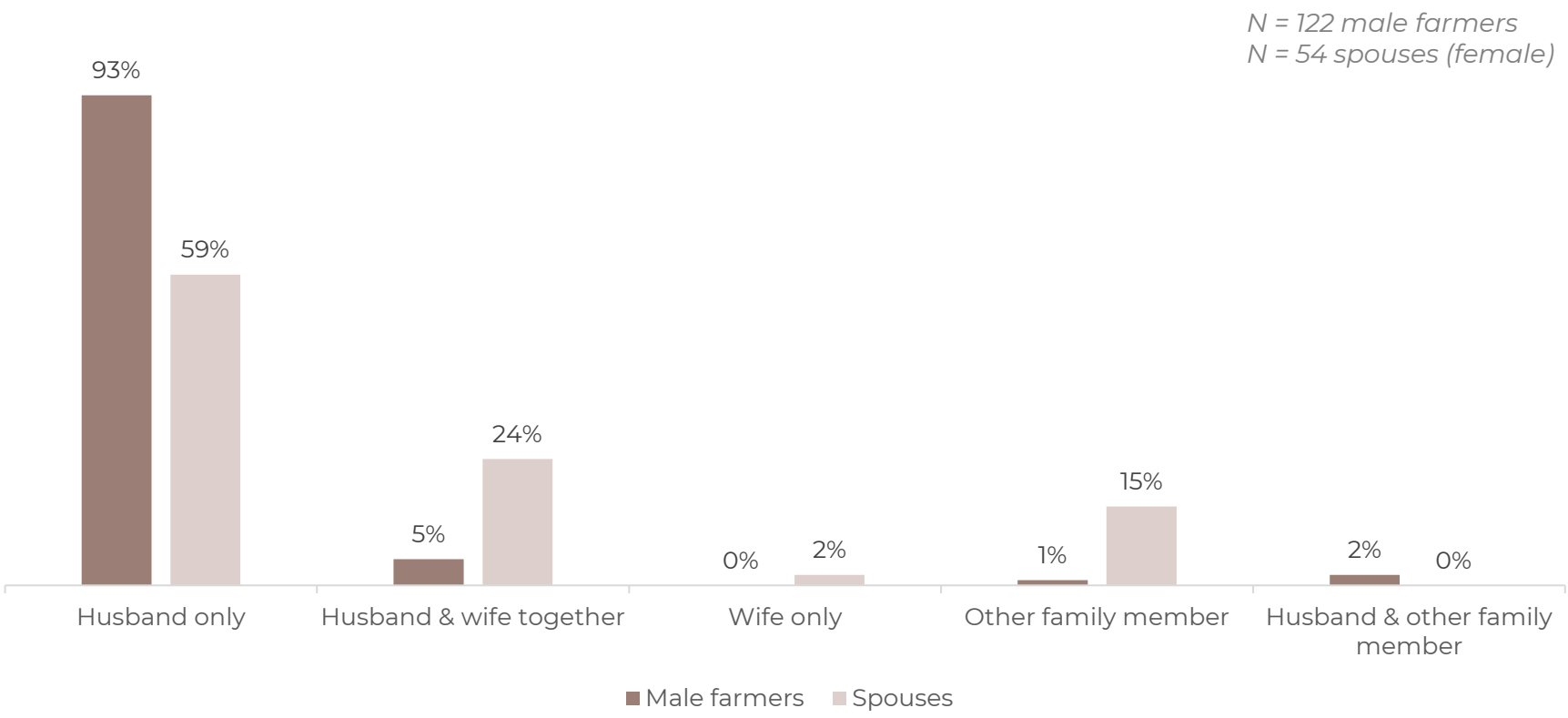
. 1 - Spouses may not be spouses of the male farmers interviewed. 2 - Includes renting tractor, working as electrician, washing clothes etc.

Spouses had a similar view as male farmers on most topics, except in decision making and reduction in soil fertility

"The soil fertility has decreased in the last 5 years due to which I need to apply more fertilizers, but have been observing a decline in yield"

Male farmers stated taking decisions themselves but only 59% spouses feel so; 1 in 4 spouses feel they are involved in decision making regarding **buying inputs**

Decision making[1] on purchasing of inputs for male farmers and spouses[2]



"I decide where to purchase inputs from. If I don't know a disease, I approach agricultural officer and buy accordingly."

- Male farmer in Satyasai

"I and my husband together discuss and decide where to buy inputs from."

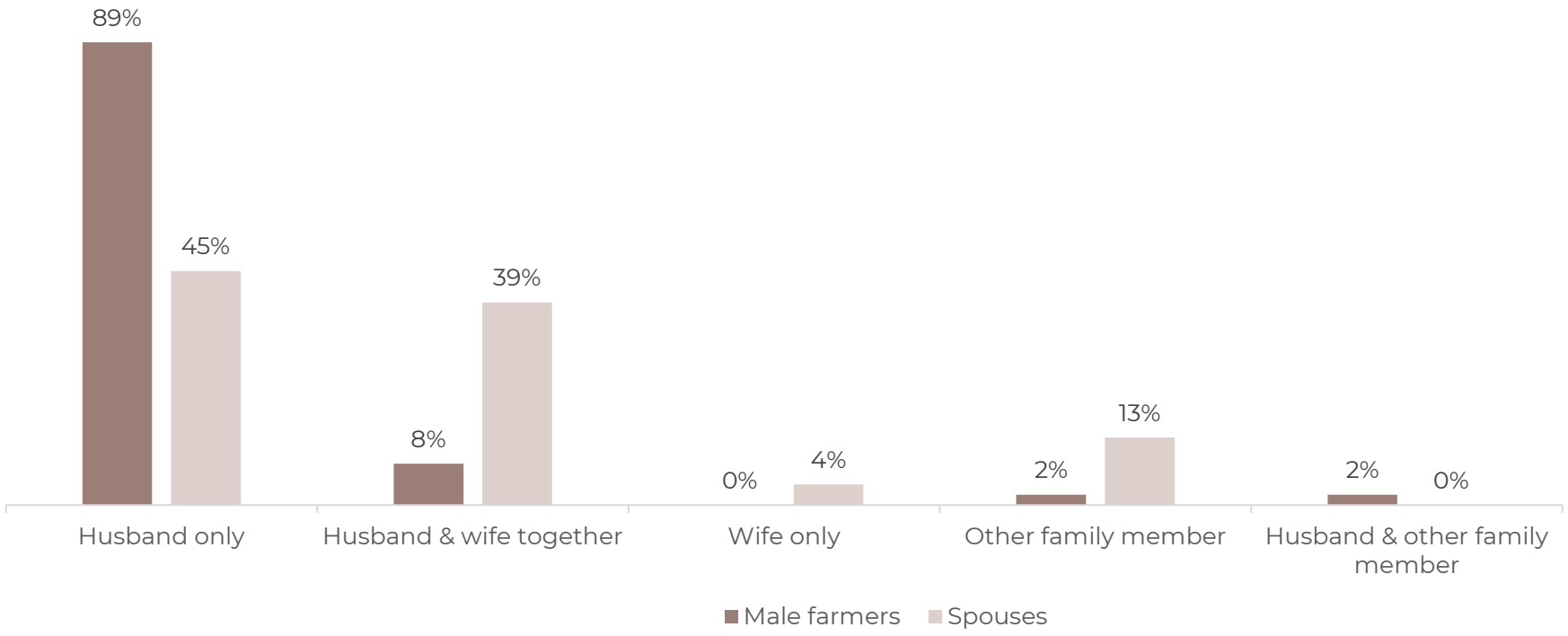
- Spouse in Hanumankonda

1 – To understand decision making roles in small farmer households, the research team asked three questions to farmers and to spouses: (a) Who decides what inputs to buy and from where (b) Who decides what crop to grow (c) Who decides where to sell the produce. 2 - Spouses may not be spouses of the male farmers interviewed

Male farmers stated taking decisions themselves but only 59% spouses feel so; 1 in 4 spouses feel they are involved in decision making regarding **what to grow**

Decision making[1] on which crop to sow for male farmers and spouses[2]

N = 122 male farmers
N = 56 spouses (female)



"I take the decision of which crop to sow in every season. I might discuss it with other family members, but the final decision is taken by me."

- Male farmer in Kalaburagi

"Me and my husband decide together which crop to grow. This year he wanted to grow groundnut but I wanted to grow beans, so he agreed."

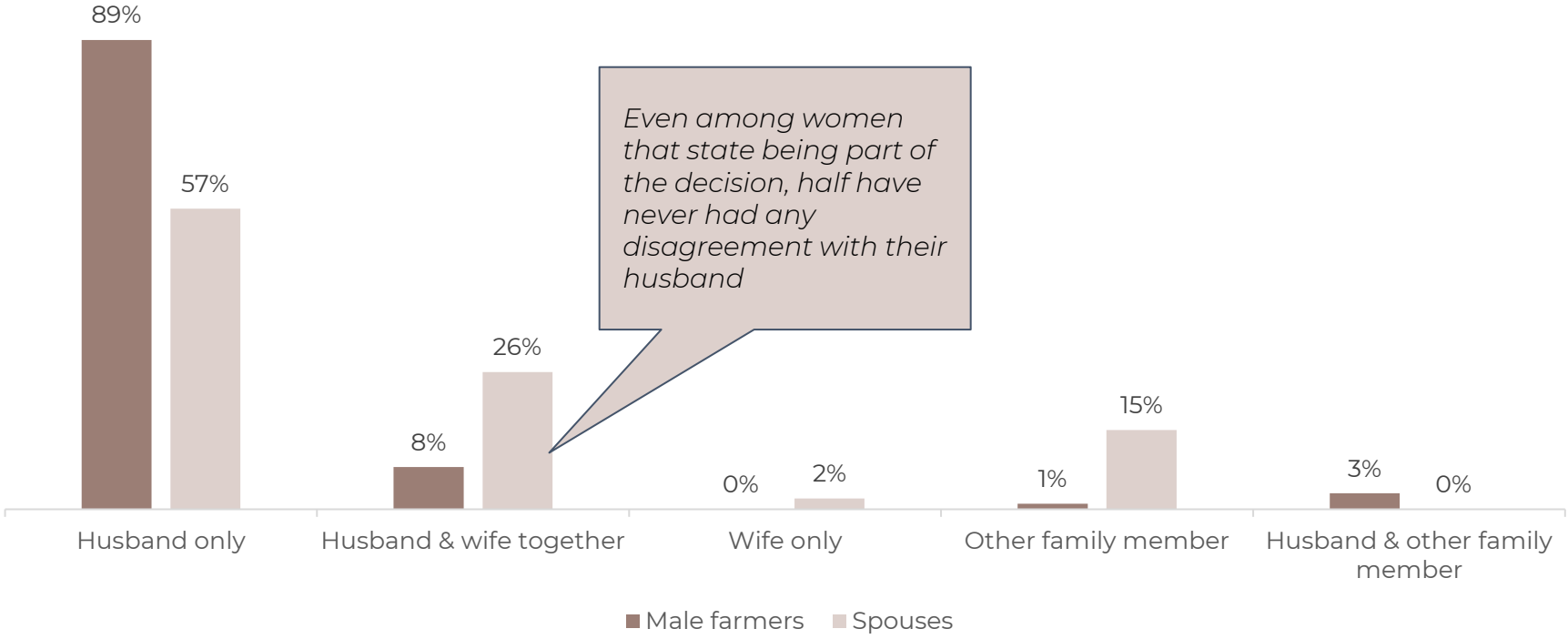
- Spouse in Satyasai

1 – To understand decision making roles in small farmer households, the research team asked three questions to farmers and to spouses: (a) Who decides what inputs to buy and from where (b) Who decides what crop to grow (c) Who decides where to sell the produce. 2 - Spouses may not be spouses of the male farmers interviewed

Male farmers stated taking decisions themselves but only 57% spouses feel so; 1 in 4 spouses feel they are involved in decision making regarding **selling produce**

Decision making[1] on selling of produce for male farmers and spouses[2]

N = 122 male farmers
N = 53 spouses (female)



Even among women that state being part of the decision, half have never had any disagreement with their husband

"I decide the selling of produce on my own. I discuss with my son sometimes, but he is very young to take any decision."

- Male farmer in Satyasai

"I and my husband together discuss about where to sell the produce, but the final decision lies with him only."

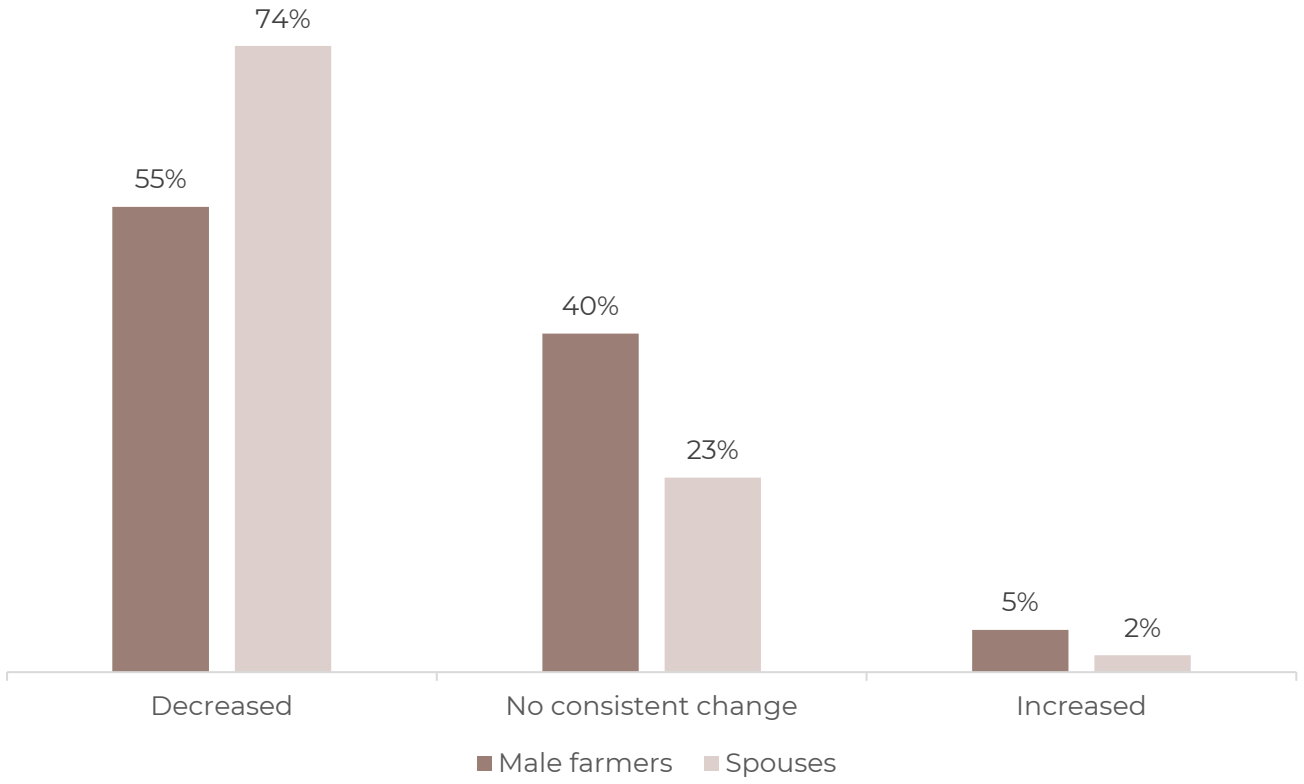
- Spouse in Satyasai

1 – To understand decision making roles in small farmer households, the research team asked three questions to farmers and to spouses: (a) Who decides what inputs to buy and from where (b) Who decides what crop to grow (c) Who decides where to sell the produce. 2 - Spouses may not be spouses of the male farmers interviewed

Lesser male farmers (55%) than their spouses (74%) feel that fertility of soil has gone down

Perception of male farmers and the spouses[1] about change in fertility of soil in last 5 years

N = 107 male farmers
N = 47 spouses



"I feel that soil fertility as reduced because earlier, I had cattle and used to put farmyard manure before sowing, but now I don't add as much manure. Adding just chemicals reduces microbial activity in soil."

- Male farmer in Hanumankonda

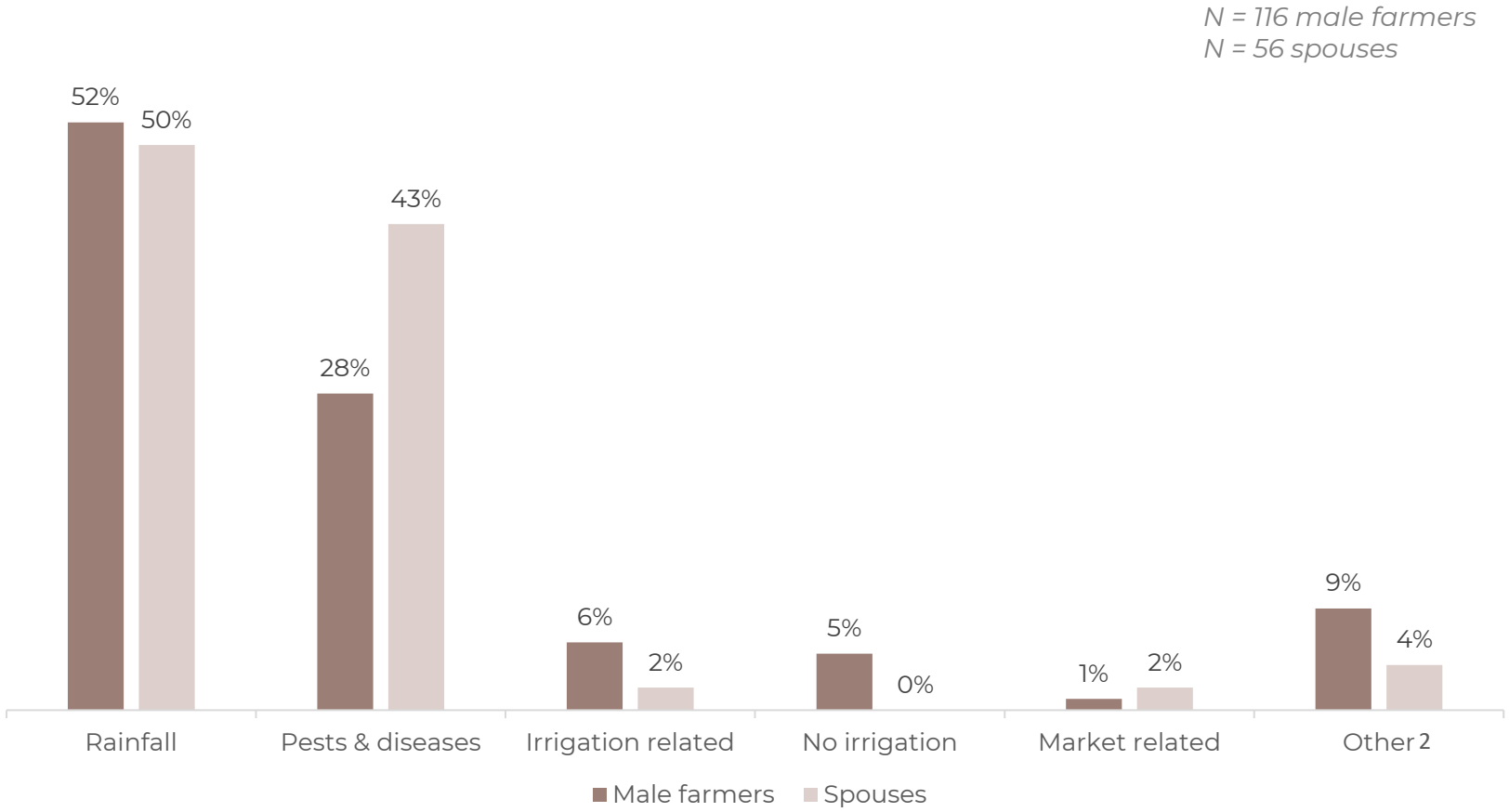
"Soil fertility has gone down because of usage of chemicals. This has led to a decline in yields also."

- Spouse in Kalaburagi

. 1 - Spouses may not be spouses of the male farmers interviewed

Both male farmers and their spouses feel that rainfall is top concern: 52% and 50%; Pests, diseases seen as a concern by more spouses than male farmers

Top concerns cited by male farmers and the spouses[1]



"Sometimes, the rainfall starts very early and sometimes, it happens late. This unseasonal rainfall leads to crop damage also."

- Male farmer in Mahendargarh

"Rainfall during the harvesting time leads to damage in the grains. This leads to lower price of grains in the market."

- Spouse in Satyasai

1 - Spouses may not be spouses of the male farmers interviewed. 2 – Includes responses such as No concern, inputs related etc.
Summation of individual percentages in the graph do not add up to 100% because of rounding.

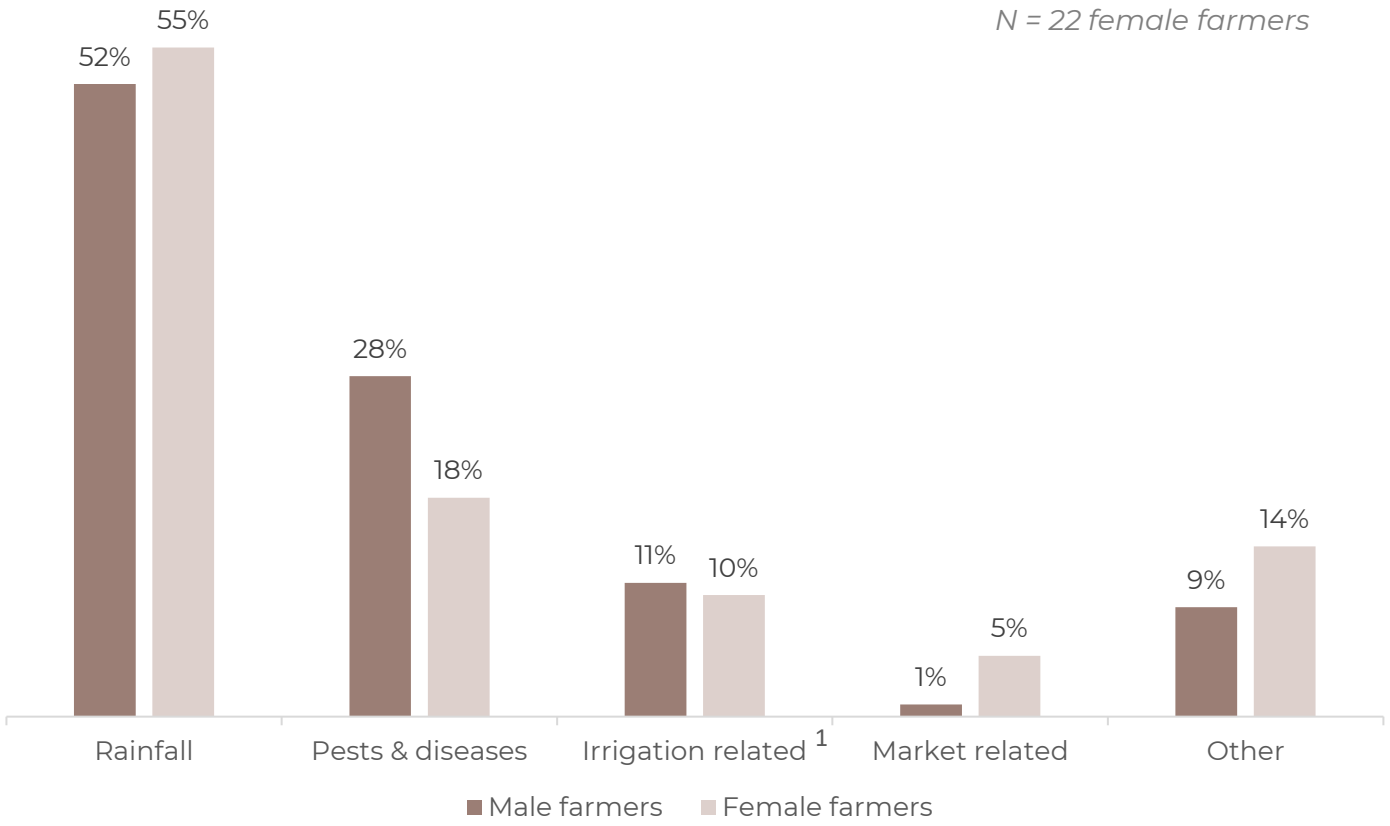
Female farmers had similar views as male farmers on top concerns and impact of climate on agriculture, but had a different perspective on some farming practices

"I have not changed the seed variety in last few years. I do not do crop rotation and do not receive rainfall forecasts"

Male (52%) and female farmers (55%) feel that rainfall is top concern; Male farmers (44%) and female farmers (45%) feel that texture of soil has worsened

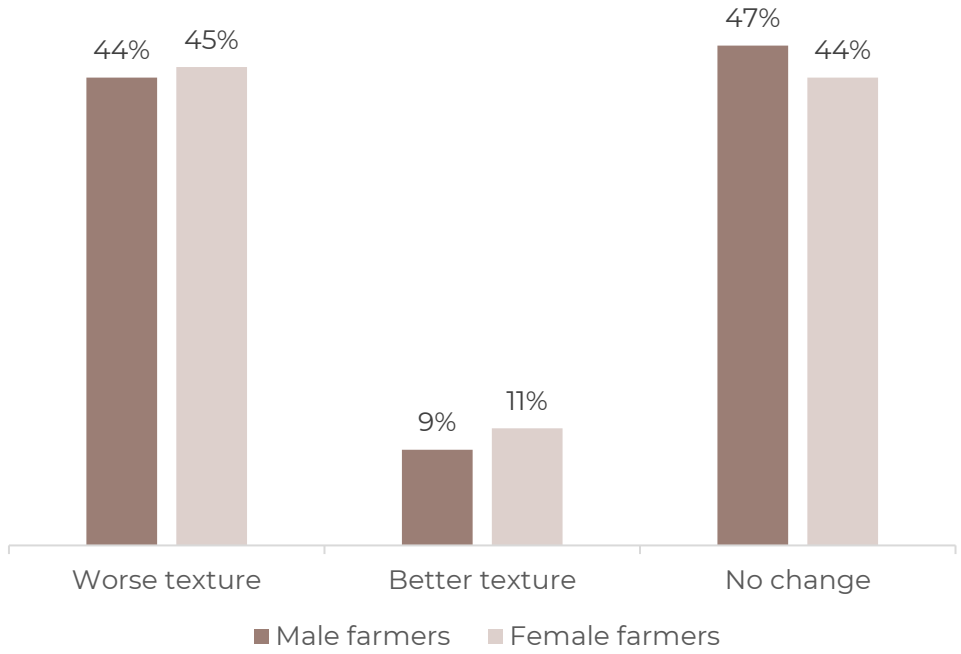
Top concerns cited by male farmers and the female farmers

N = 116 male farmers
N = 22 female farmers



Perception of male farmers and the female farmers about change in fertility of soil in last 5 years

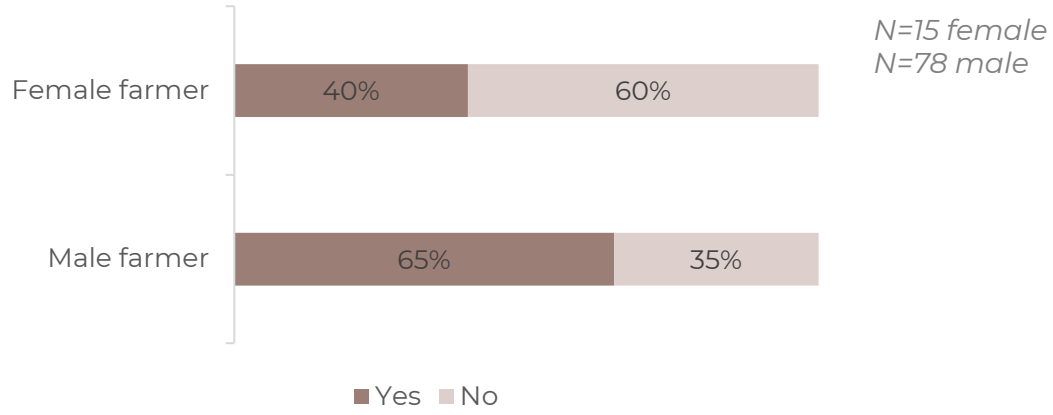
N = 112 male farmers
N = 22 female farmers



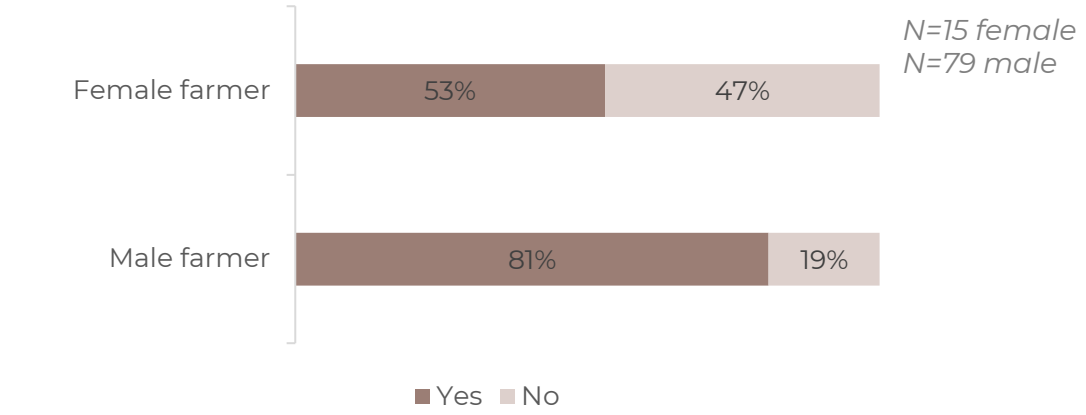
1 – Includes responses such as no irrigation, electricity issues

Fewer female farmers as compared to male farmers mentioned doing practices like crop rotation, using farm yard manure, using rainfall forecast information etc.

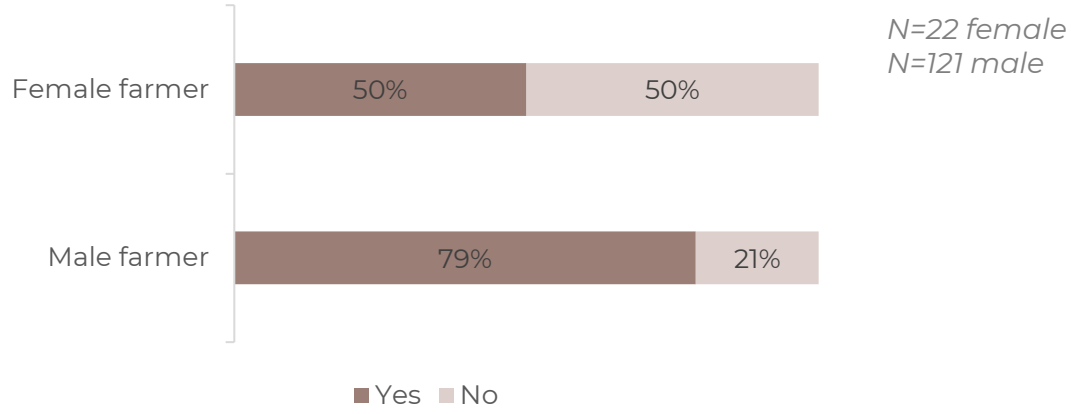
Male farmers and female farmers who practice crop rotation



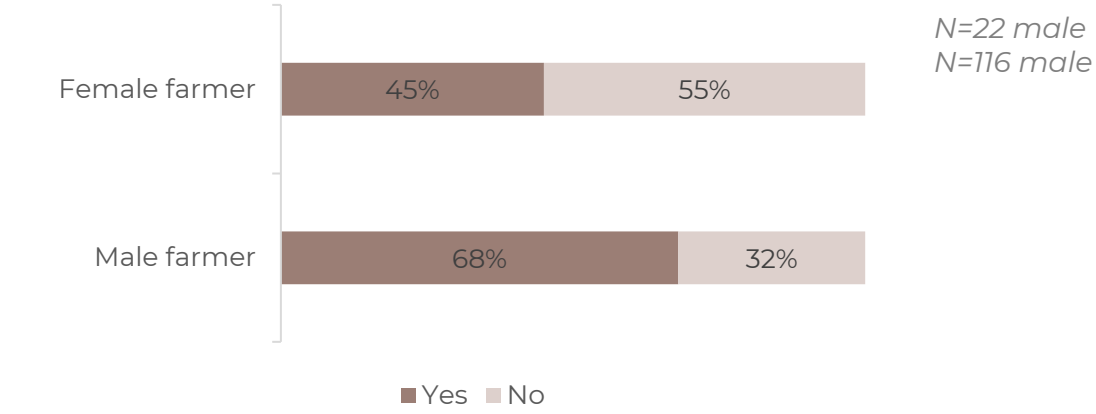
Male farmers and female farmers who use farm yard manure



Male farmers and female farmers who receive rainfall forecasts



Male farmers and female farmers who changed seed variety in the last 5 years



Appendix

- **Sampling approach and farmer demographics**
- **Learnings about conducting this research**
- **About The Nudge Institute (T/NI)**
- **About Transforming Agriculture for Small Farmers (TASF) at T/NI**

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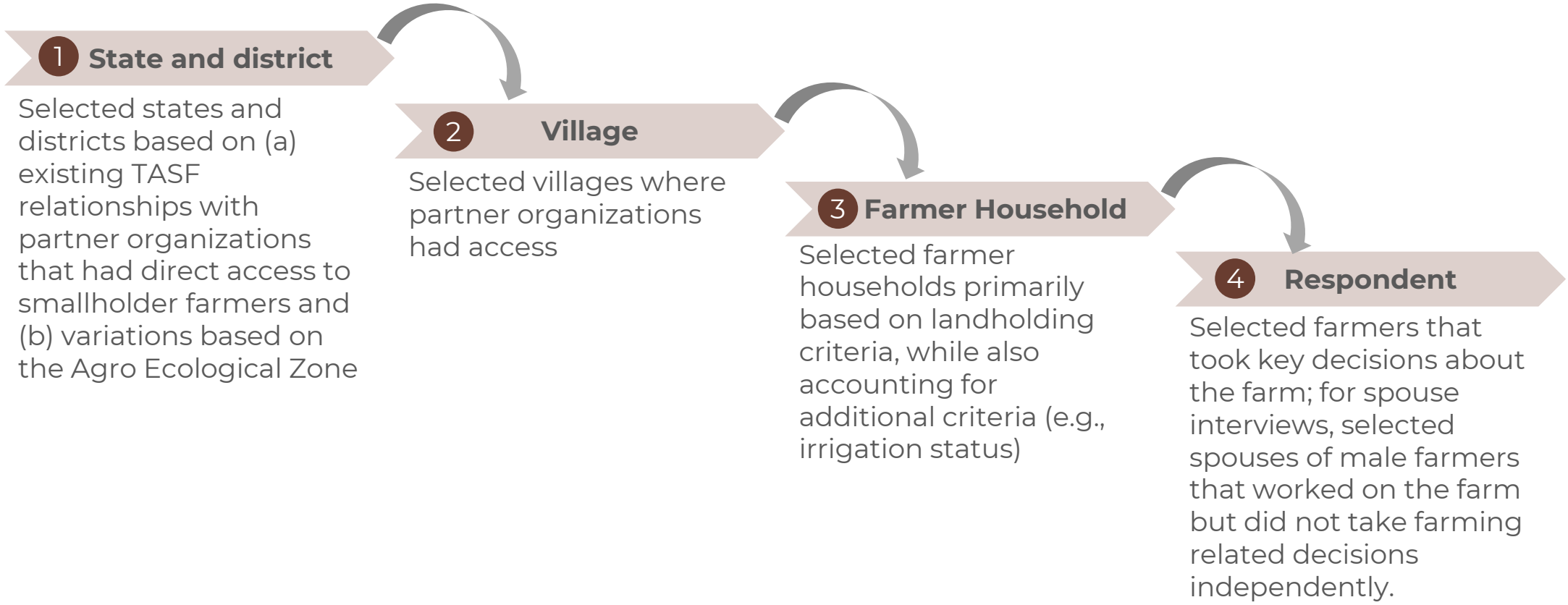
Sampling approach



The research is based on a relatively small sample and did not utilize random sampling. Hence, findings may only be directionally indicative and are not intended to be numerically representative of the smallholder farmer population in India

State, district, and village selection

1 State and district selection

Selection of state and district was based on two factors

(a) Presence of TASF partner organization that was willing and able to support

- Partner organizations identified farmers based on criteria shared by the research team
- They also provided field resources that helped translate interviews in the local language when required

(b) Variations based on Agro Ecological Zones

- India is divided into 20 Agro Ecological Zones; zones are defined based on soil, physiography, Length of Growing period (LGP), bioclimate[1].
- Each zone is further divided into multiple sub-zones
- When selecting states, we tried to select a state that is in a different Agro Ecological Zone from another state we conducted research in
- When selecting districts within a state, we tried to avoid the same sub-zone in cases where we went to multiple districts in the same state (e.g., Maharashtra)
- We also avoided Agro Ecological Zones where the soil type and other weather conditions may have been very specific to that region and not generally found in other parts of the country (e.g, dry arid regions of Kutch)

2 Village selection

We selected villages where partner organizations had access

- We visited at least 2 villages within a district
- When possible, we avoided villages in which the partner organization had conducted several agricultural interventions (e.g., skill building, training), as farming practices may then not be representative of average farmers in the country

. 1 – Source: Agro-Ecological Zones, their Resource and Cropping System

Farmer household and respondent selection

3 Farmer household selection

We selected small farmer households based on their landholding

- For irrigated land: owned 1-3 acres of land
- For rainfed land: owned 3-7 acres of land
- For partially irrigated: owned up to 7 acres of land (with irrigated land being no more than 2 acres)
  - When possible, we focused the interview with these farmers only on their irrigated or rainfed portion of the land and tagged them as such
  - In other cases, we analyzed this group separately as 'partially irrigated' farmers

We also considered irrigation status when allocating the sample

- If a research location had both irrigated and rainfed farmers, we divided the sample for that location roughly in proportion to the national split of smallholder farmers based on irrigation status – i.e., 35% irrigated, 49% rainfed, and 16% partially irrigated[1]
- In cases where a research location predominantly had smallholder farmers that belonged to a single irrigation status, we tried to balance the overall sample (across all locations) against the national average

Additionally, we checked for the following criteria to ensure that most interviewed farmers within a location

- Used farming practices typical across the country (e.g., chemical fertilizers)
- Earned a sizeable proportion of the household income from farming
- Did not own tractors

. 1 – Source: Agriculture Census 2010-11

4 Respondent selection

For interviews with male and female farmers we interviewed the key decision maker

- We defined key decision makers as someone that takes at least one of the following decisions
  - What to sow
  - Where to buy inputs (e.g., fertilizers)
  - Where to sell the produce
- We also checked if the key decision maker was either taking these decisions themselves 5-6 years ago as well or were closely invovled in the farming practice to make sure they were aware of changes in climate and its impact on their farming over a five-year period

For interviews with spouses, we interviewed women that worked on farms but may not be involved in decision making

- Spouse interviews were not always conducted with the spouse of a male farmer that was interviewed

Sample distribution by irrigation status and gender

Interviews with farmer who made decisions

Distribution by Irrigation Status[1]

Completely Irrigated	Partially Irrigated	Rainfed	Total
56	18	71	145

Distribution by Gender

Female	Male	Total
22	123	145

Interviews with spouses of male farmers

Distribution by Irrigation Status

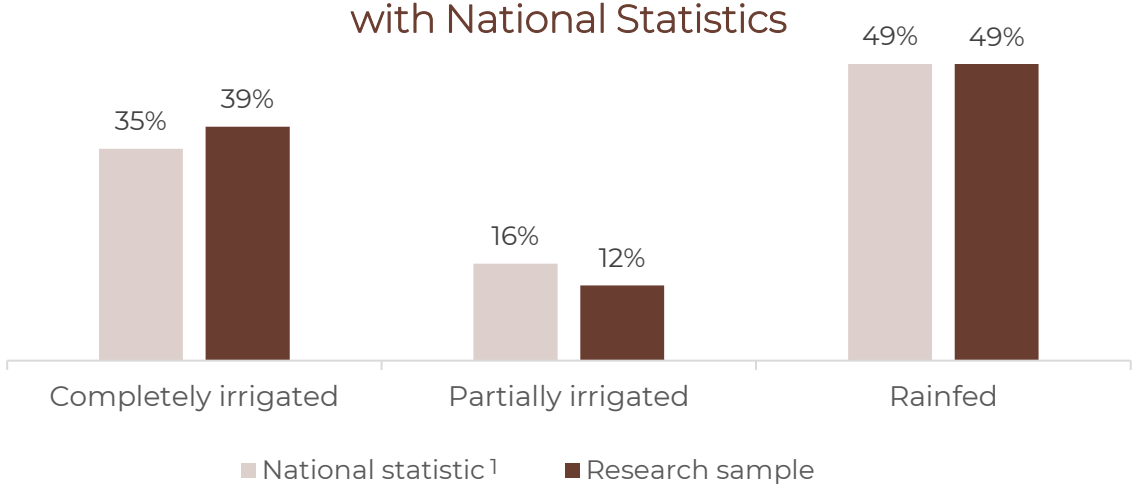
Completely Irrigated	Partially Irrigated	Rainfed	Grand Total
29	5	22	56

All interviews were conducted in the local language best understood by the respondent

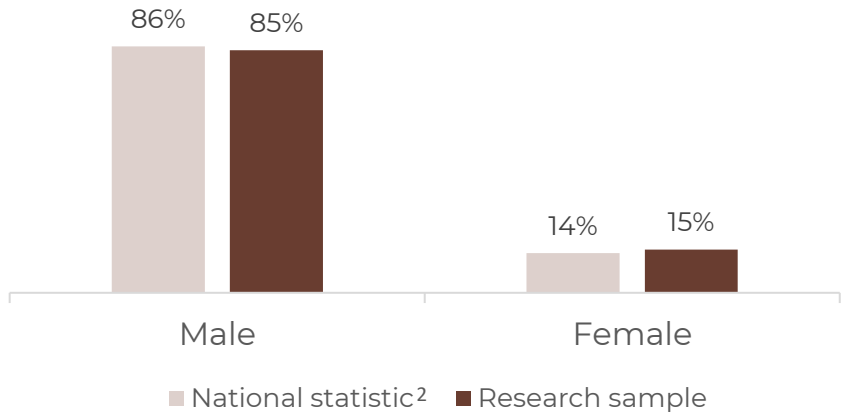
. 1 – Six partially irrigated farmers have been mentioned as “Completely Irrigated” or “Rainfed” as for the interview purpose, we decided to focus either on the irrigated or the rainfed part of the land only.

Our sample closely matched national statistics on irrigation status and gender, but may have oversampled older farmers

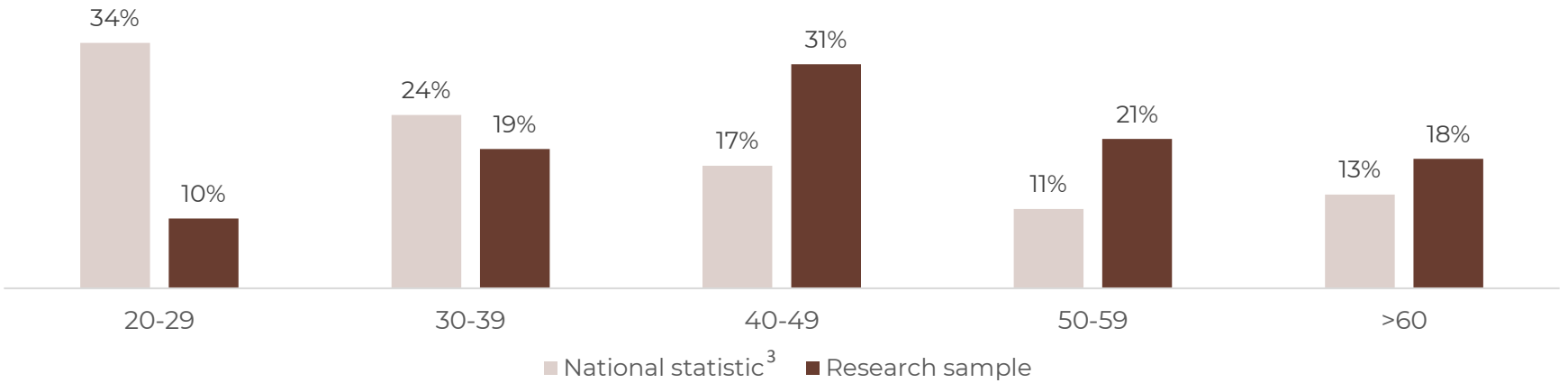
Sample division by Irrigation Status compared with National Statistics



Sample division by Gender compared with National Statistics



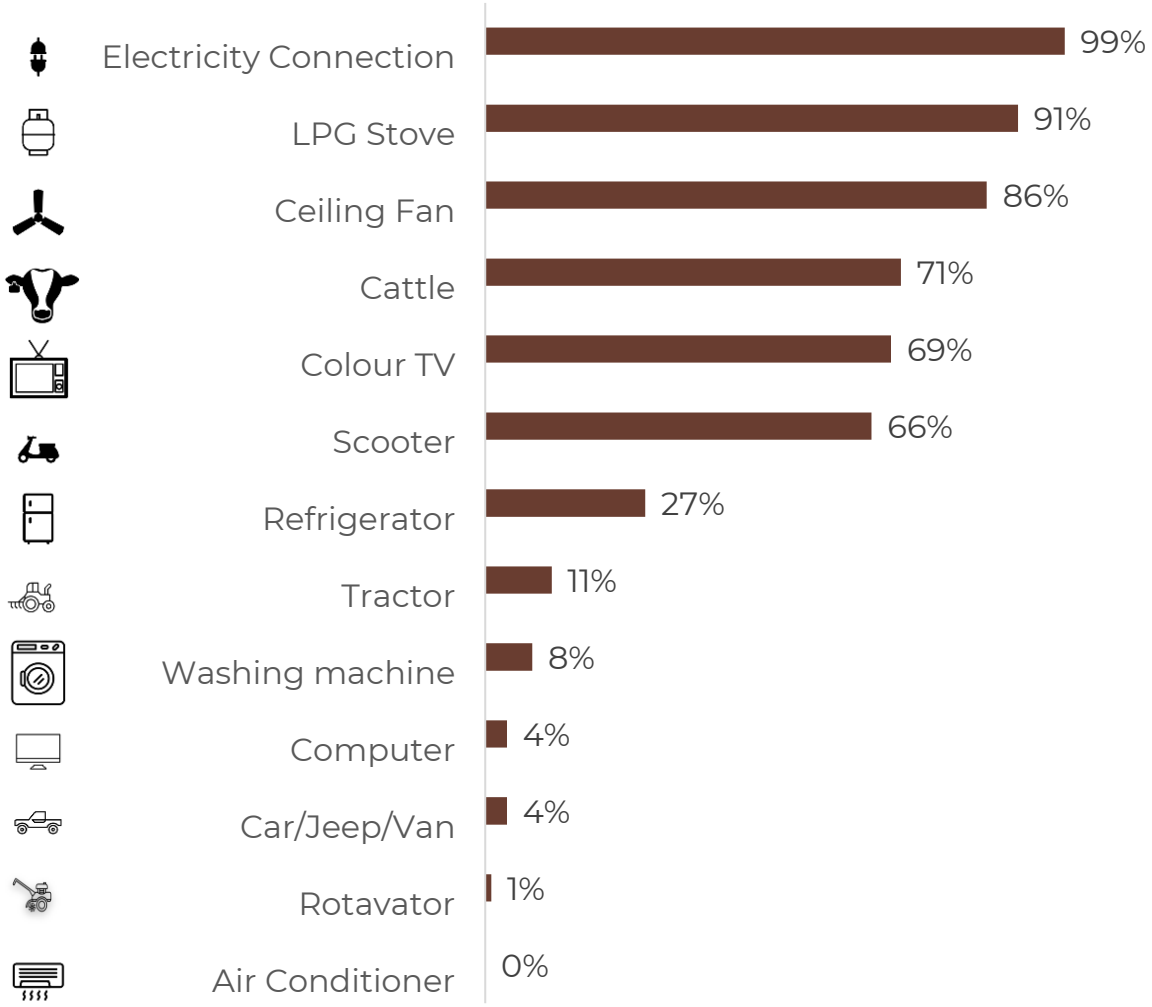
Sample division by Age compared with National Statistics



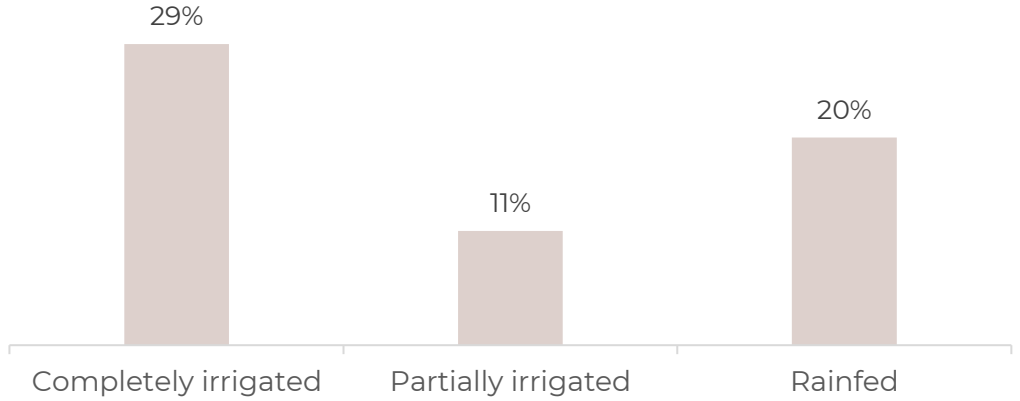
1 – As per the Agriculture Census 2010-11 of India for smallholder farmers (farmers with landholding of 1-2 hectares). 2 – As per World Bank; the research team has used land ownership as a proxy to help determine gender split among farmers. 3 – As per the Sample Registration System Statistical Report 2020 for age distribution of rural populations; national statistic scaled to 100% for ages 20 and above since research team did not interview anyone below the age of 20; national statistic is of all rural populations and it is possible that the farming population within that is relatively older (this may explain a part of the oversampling of older farmers)

Our sample had access to electricity, LPG, fan and had average landholding of ~2 acres for irrigated land & ~2.5 acres for rainfed land, some have leased lands too

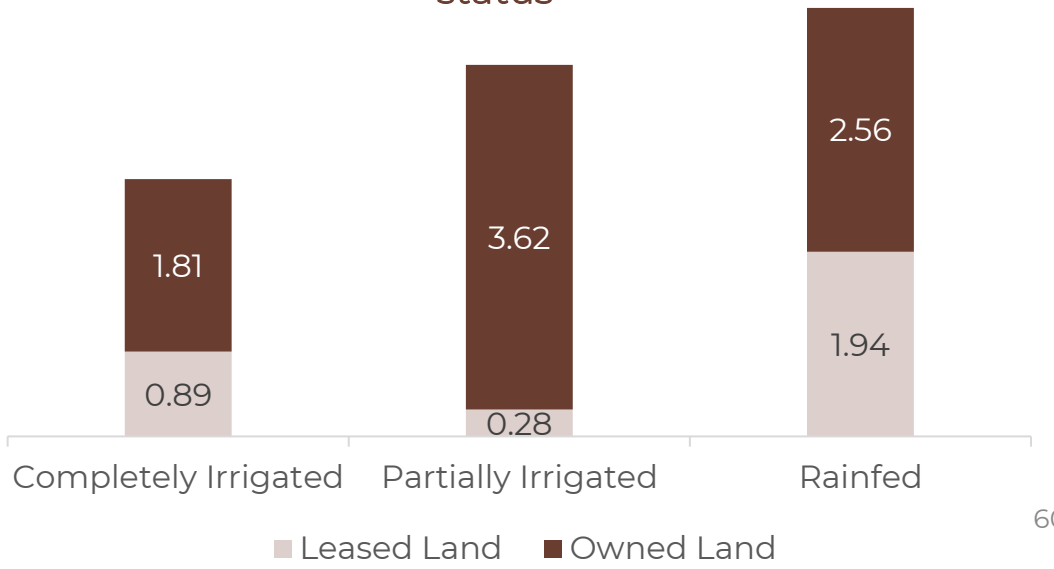
Asset ownership of small farmer households



% of smallholder farmers with leased land, by irrigation status



Average owned and leades (acres), by irrigation status



Appendix

- **Sampling approach and farmer demographics**
- **Learnings about conducting this research**
- **About The Nudge Institute (T/NI)**
- **About Transforming Agriculture for Small Farmers (TASF) at T/NI**

Learnings from conducting research with smallholder farmers (1/2)

Learning	Implication to research design or analysis
Open-ended questions, specifically on the topic of climate/environment, were not answered correctly by farmers • Non-specific and open-ended questions (e.g., What activities are you conducting to mitigate the climate and environmental challenges you face?) mostly resulted in farmers saying they are not doing any activity/practice • However, when asked if they conducted crop rotation, or heeded to rain forecasts during other parts of the interview we received a more specific response	Replaced open-ended questions of this nature with specific questions about activities that farmers may be taking to increase yield and/or income (e.g., crop rotation, seed change, rain forecast, using farm yard manure)
Some open-ended questions were not well understood by farmers and did not result in useful responses • Open-ended questions such as, What are key changes to your farming in the last 5 years, What changes have you observed related to irrigation in the last 5 years, often yielded no response from the farmers	Dropped such questions from the interview guide
Spouses of male farmers who worked on the farm but may not have been involved in decision making often had limited information about some topics • Spouses were not aware about topics such as changes in yield, amount of inputs used, etc. • Spouses typically had a point of view about things they were directly involved in such as, key challenges, changes to soil, changes in their time on the farm	Avoided asking spouses about yield, inputs/chemical usage and instead focused on topics that they were more familiar with

Learnings from conducting research with smallholder farmers (2/2)

Learning	Implication to research design or analysis
Female farmers (women that take decisions about the farm) were difficult to locate • The team used national statistics for land ownership, by gender, to determine the proportion of the research sample that should be allocated to female farmers. And even though that proportion was met, the difficulty that field teams had in finding women in decision making roles indicates that the proportion of female farmers may be lower	None
Variability in responses for changes in certain climatic conditions (e.g., changes in summer and winter temperatures, changes in frequency of storms) within the same village and district • Respondents often had divergent views on some of the above mentioned topics within the same village (e.g., among farmers in 2 nearby villages 45% reported summer temperatures rising and 25% reported summer temperatures falling in the last 5 years) • Responses tended to be less divergent for climatic conditions that were more easily perceptible (e.g., rainfall)	Dropped the data gathered from these questions and chose not to share it in the report
Questions that asked about impact of specific climatic changes on farming provided similar response from all farmers • When asked what changes in winter and summer temperatures, rainfall, water availability, soil changes, etc. had on farming, most farmers mentioned a negative impact on yield • Hence, this set of questions were not helpful in understanding which climatic conditions are impacting the farmers the most	Added questions that asked farmers about the reason for most recent crop loss (if any), and reasons for decrease in yield (if that were the case)

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3 centres | 8 programs | 360+ nudgesters

End Ultra Poverty

eradicating extreme poverty through the graduation approach, in p'ship with govt (pilot: Jharkhand)

1170+ families

85% women witnessed asset growth by 1.6x

50% women engaged in 2 different livelihoods

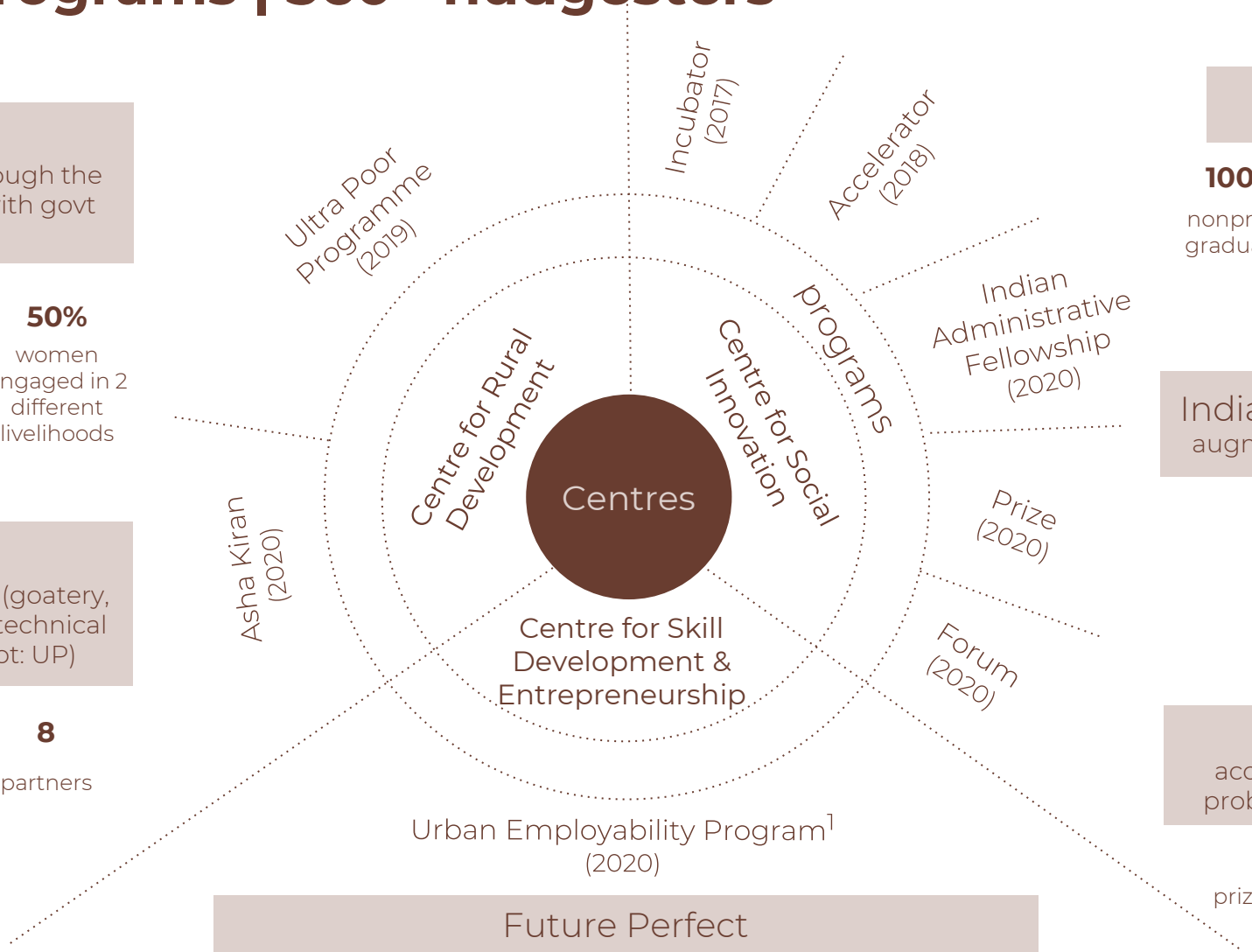
Asha Kiran

crack sustainable rural livelihoods (goatery, poultry) in partnership with govt, technical experts and market players (pilot: UP)

8 districts

80k+ households

8 partners



Future Perfect

employability for service-oriented jobs (online + colleges)
(English + 21st century skills. 2 months. live classes. 150+hrs)

10+ states

30k+ admissions

10k+ youth trained

Incubator

100+ nonprofits graduated

Accelerator

$2.3m worth of innovation grants disbursed

7.5x grant multiplier

Indian Administrative Fellowship

augmenting state capacity (Punjab cohort)

10 fellows in Punjab cohort

Prize

accelerate dev problem solving

2 prize challenges

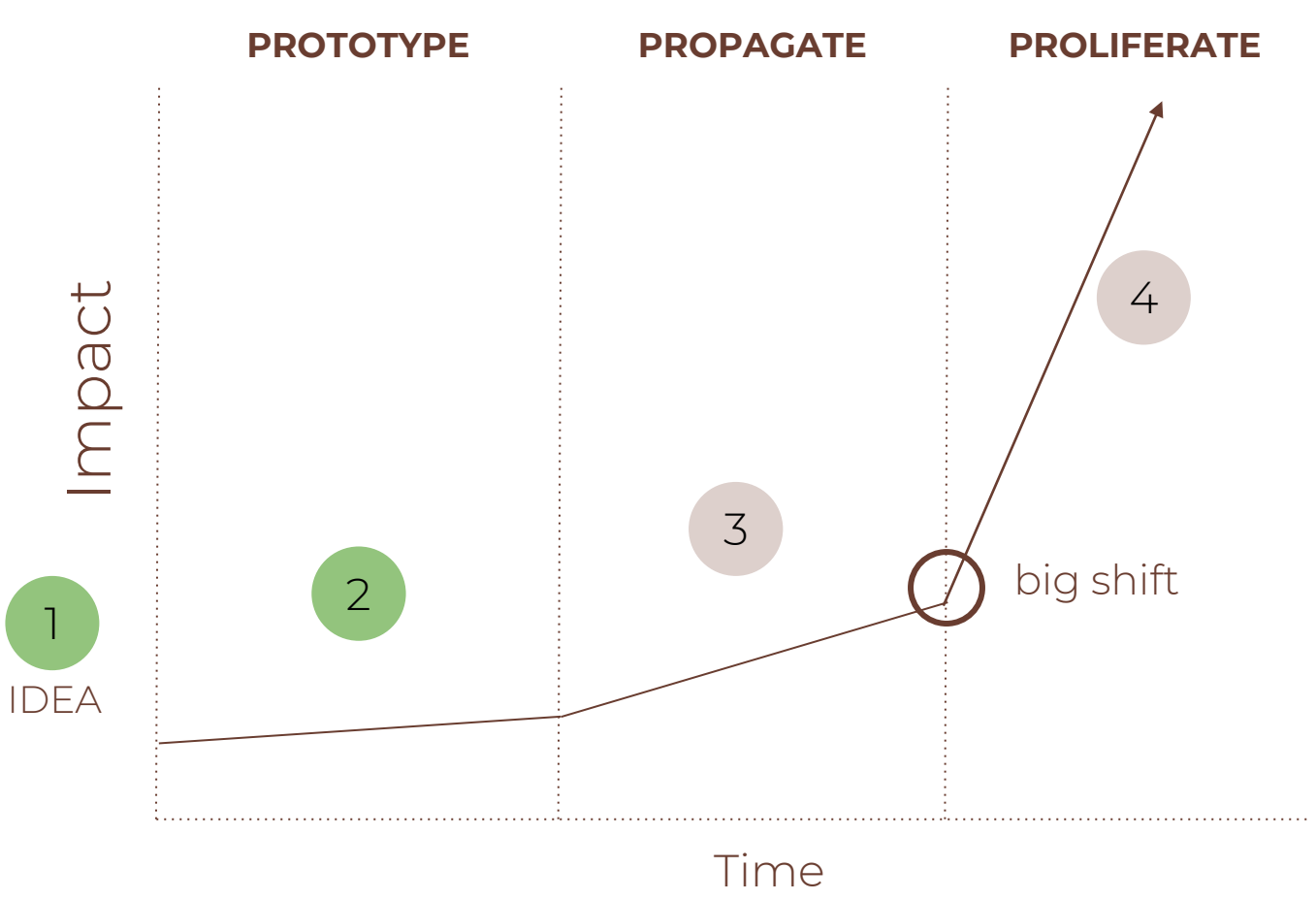
Forum

a convening platform

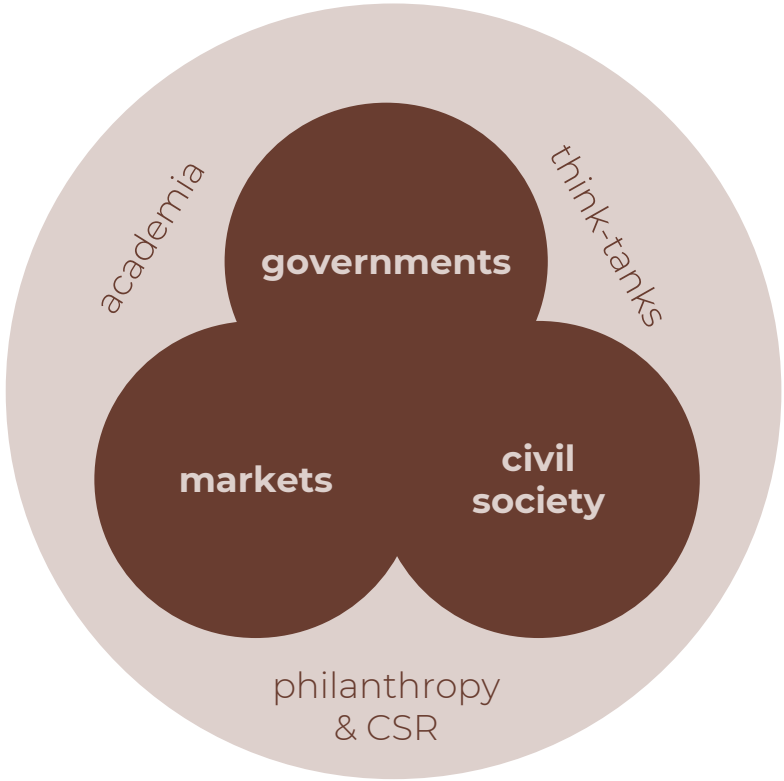
3 annual events executed

1. earlier, "Gurukul" - a residential skilling program (2015-2020) reaching 7k+ youth

Our long term approach



partnering with



designing effective solutions
: source/innovate potential solutions
: on-ground action research & iterate
: get impact evidence

driving adoption
thru targeted outreach, networks, convenings, influencers, funding, evidence

support scale
by addressing ecosystem barriers via direct support, indirect facilitation, technology, partnerships

The/Nudge partners & supporters

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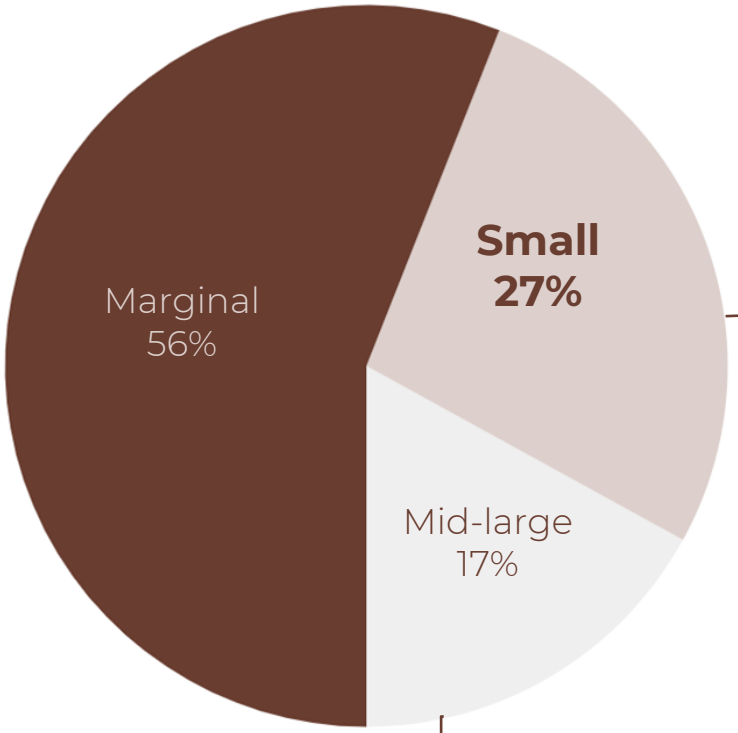
Our Goal

double the income and reduce variability for 10 million smallholder farmer households in the next 10 years

India’s smallholder farmers do not have equitable access to opportunities



Low income from cultivation
<0.4 ha of irrigated equi land

- Cultivation often for self-consumption, low surplus for sale
- Rely on non-cultivation sources such as agricultural labour, remittance, etc, which have gone up by 11% while agri has only increased by 4%

>40% income from cultivation
0.4-1ha of irrigated equi land

- Significant part of income is from cultivation but need to supplement with agri labour, dairy, renting bullocks, etc to make ends meet
- Committed to farming and identify as farmers
- Variability of income is high, majority (>70%) face crop damage at least once in past 3 years
- Ageing pop, despondent about farming, don’t want their children to become farmers

High impact potential - both increasing income by > 50% and reducing downside variability to 25%

>1 ha of irrigated equi land

- Good access to markets, better input and output prices
- High ownership of assets such as tractors and other equipment
- Targeted by AgriTech startups & solutions that improve productivity and revenues & reduce cost and dependence on labour

3 acres of un-irrigated land = 1 acre irrigated land

Hence, we decided to focus our efforts on smallholder farmers

Source: Situation Assessment of Agricultural Households and Land and Livestock Holdings of Households in Rural India, 2019; Small Farmers Big Opportunities, TASF 2022

Smallholder farmers have high income potential but need support

primary research with 100+ smallholder farmers reviewed by 40+ practitioners/experts
download the report here

covered in The Hindu, Gaon Connection and Krishi Jagran

smallholder farmers are committed to farming and have high income potential

committed to farming

SFs are committed to farming and entrepreneurial. They take calculated risks, such as leasing land to increase output

adopt current practices

SFs are familiar with current practices - use mechanisation, agri inputs, have access to price info through mobile phones, etc.

freedom to sell

typically have the choice to sell at nearby markets - usually APMC mandis and local traders

but they face challenges in fulfilling that potential

sub-optimal agri practices

practices vary across farmers - these are not scientific and usually based on advice from friends, family or past practices

climate change

increasing weather variability and unseasonal rains cause unpredictability and make farmers vulnerable to large losses

poor price realisation

limited selling options, where farmers do not get the right price for weight or quality, and pay a premium for liquidity

Vibrancy in the agri-tech sector is not reaching smallholder farmers

formal sector and agri-techs are typically targeting mid & large farmers but not smallholder farmers
as it is difficult for their business models to serve small farmers commercially

formal sector moving towards direct procurements from farmers

Olam
using a lead-farmer model to reach farmers directly and get better quality of crop

ITC Limited
collectivisation models to help farmers produce high quality yield and procure directly from the farm-gate

amazonfresh
procure F&V directly from "retail ready" farmers to get assured supply and better quality produce

waycool
helping farmers grow better output at lower cost through end-to-end support from seed to harvest

innovative organisations changing farming practices

DeHaat Seeds to Market
improving quality of inputs, enhancing credit

Fasal
tech driven farm management for better output

EM3 Agri Services
pay-per-use tech and mechanisation for farmers

INI FARMS
high quality export-ready horticulture direct from farms

we will build agri-tech capacity (commercial viability, distribution of solutions, adoption at scale) to reach smallholder farmers

Reimagining the way smallholder farmers are reached are served

Interventions that can be adopted and implemented at scale by the market

We will...

prototype

identify interventions, develop business models & do action research to shortlist solutions

propagate

enable multiple players to use the solutions, expand geographies, crops, farmer segments

proliferate

enable interventions to scale

identify commercially viable interventions and implementation players *(significant value identification, due diligence, buy-in)*

develop commercially viable business models with implementation partners

→

design & support action research to confirm economics and impact, refine models

(stakeholder research, roles of partner and implementer, geos, # of SFs reached, monitoring & evaluation, learning framework etc)

→

assess impact of the intervention *(documenting evidence)*

+

shortlist/ create/refine interventions and develop viable scale pathways *(address challenges, identify opportunities, further action research)*

→

facilitate replication of model across multiple players who will, in addition to serving more farmers, target new segments, crops, and channels

(Identify other players delivering/capability to deliver similar interventions and support them in serving small farmers, work with intervention partner to identify further action research, refine models etc) and mid term implementation plan with increased # SFs served)

→

facilitate a supportive ecosystem to enable increasing number of players start using models at scale

- unlocking capital
- leverage existing ecosystem
- addressing ecosystem barriers
- supportive policy
- create shared infrastructure

Our Sub-programmes

WRMS – Assured Yield Product (2022 06)

SecuFarm is an assured yield product by WRMS whereby farmers are aided with both technology and a package of practices to help increase yield and lower costs, in exchange for a fee. In addition, it also uniquely provides an assured yield for the package of practices and compensates farmers for losses in production due to factors such as weather and pests.

Agri-IKIGAI (2022 09)

Agri-IKIGAI – agricultural practices which are -

Good for Environment: reduce greenhouse emissions, regenerates soil health, improves water table, etc.

Good for Consumers: provide lower residue/ nutritious food (diverse nutrient profile) to consumers

Financially beneficial for Farmers: provide greater income in the short run (within 2 seasons), to enable switching

Current work includes (i) bringing the voice of the smallholder farmer to the environmental table and (ii) identifying, piloting and scaling some Agri-IKIGAI practices

Reimagining the FPO (2023 03)

An Integrated Agri Venture (IAV) that uses FPOs to serve small farmers

IAV will run all aspects of the business, including:
Overall **design of business**, e.g., selecting value chains, participation in processing, etc

Managing all **operations**, including negotiating and *transacting* with buyers, input and service providers, arranging financing, coordinating post processing, etc.

Using FPOs for **last mile execution** and building and managing localized infrastructure like post processing, decentralized manufacturing.

The IAV will also support the FPO on **compliances, HR, IT**, etc

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