TOGETHER
WE EMPOWER
RURAL INDIA

Baseline Study
Laser Land Leveling

Research Monitoring and Evaluation

October-2016

Susmita Guru

Background

What is laser land leveling? (3L)

❖The uneven lands are leveled through the laser technology within a certain degree of desired slope using a guided laser beam throughout the field

<u>Benefits of 3L</u>

1. Save 25-30% water in irrigation
2. Improve crop yields

Cont…

3. Uniform germination
4. Reduce weed problem
5. Improve uniformity in crop maturity
6. Reduce labour cost
7. Time saving in irrigation and reduce labour needs

Project overview

TOGETHER
WE EMPOWER
RURAL INDIA

- Towards creating a self sustaining agricultural practice, SF has taken an initiative to level the lands of farmers through laser technology

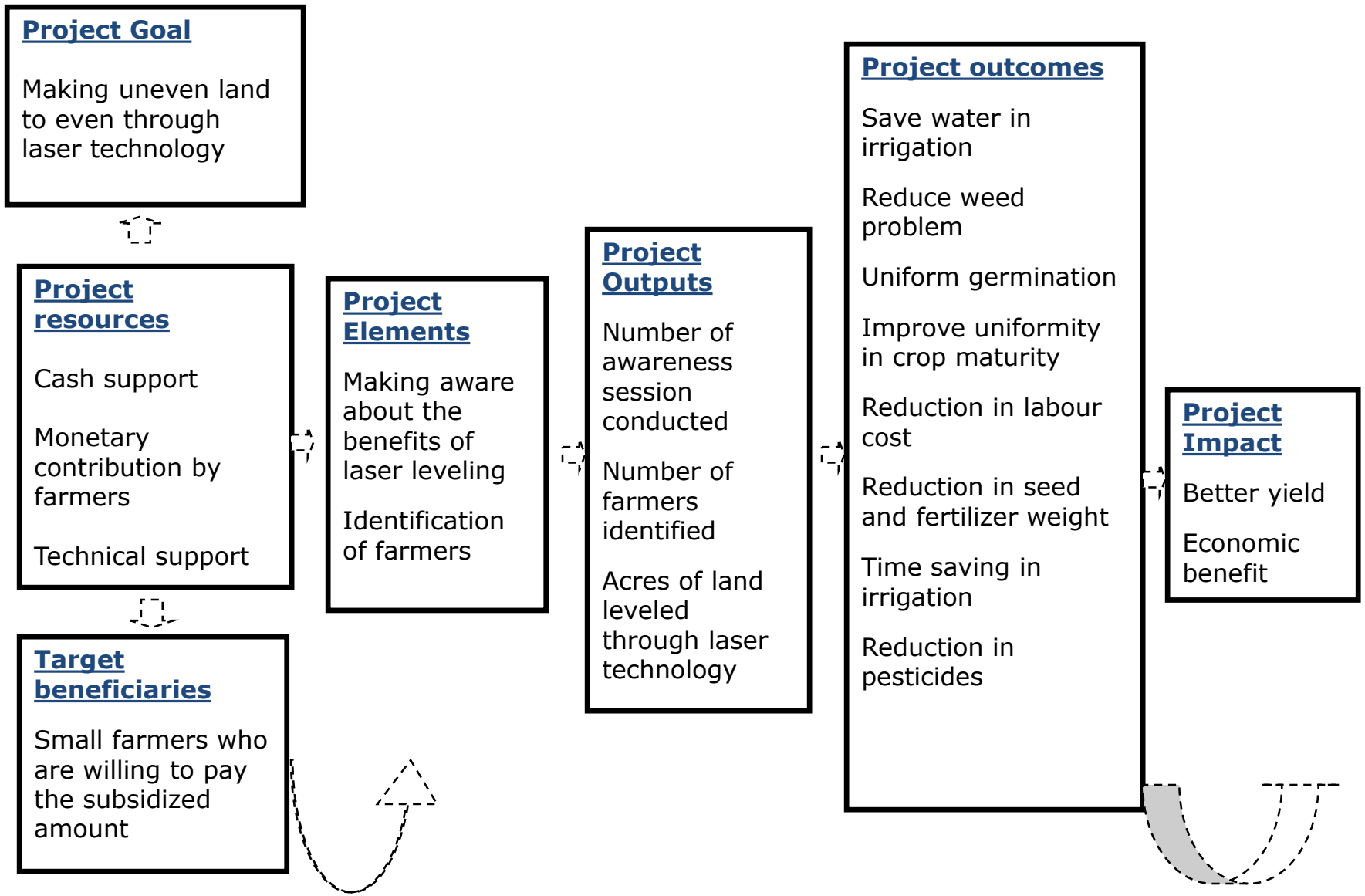
- The pilot project covered 7 villages and two blocks
  - Nagina=6 Firozpur Jhirka=1

- 120 acres of land of 120 farmers (1 acre each) have been leveled through the technology with an subsidized amount.

- There were no selection criteria's for the beneficiaries.

Log frame

TOGETHER WE EMPOWER RURAL INDIA



The study…

TOGETHER
WE EMPOWER
RURAL INDIA

- Information are collected in respect to :
  - Quantity of water, time and money spends on irrigation
  - Labour cost on irrigation, weeding and insecticide
  - Amount of seeds and fertilizers used on farming
  - uniformity in respect to crop germination and crop maturity

Methodology

TOGETHER
WE EMPOWER
RURAL INDIA

- Methods
  - Qualitative and Quantitative
- Tools:
  - Structured coded Interview schedule
  - Focus Group Discussion
- Sampling
  - Villages: Purposive sampling
  - Respondents: Random purposive sampling
- Sample Size
  - 60 (50% of the beneficiaries)

Village wise Distribution of respondents

TOGETHER
WE EMPOWER
RURAL INDIA

Village	Samples
Bhadas	7
Jataka	17
Mandikhera	13
Nagina	18
Siswana	5

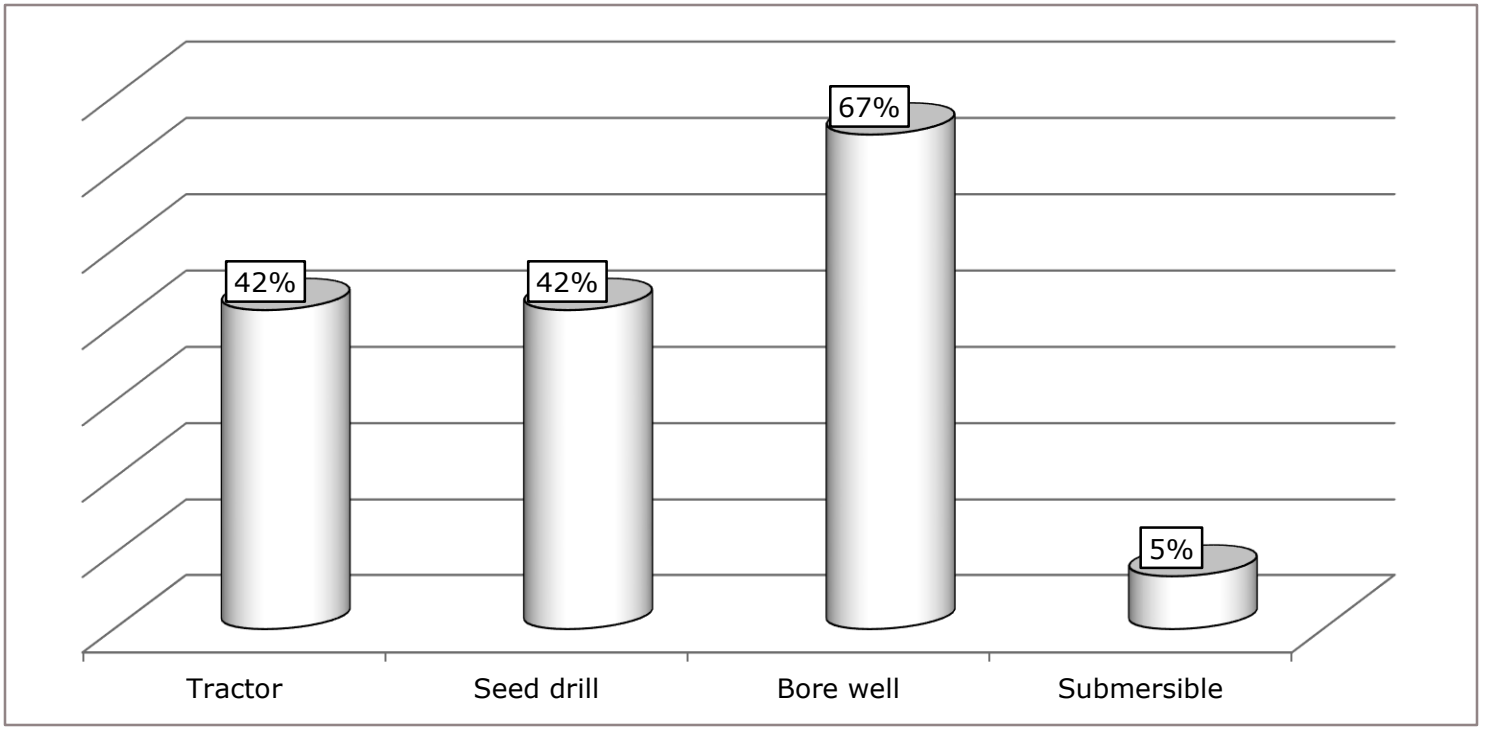
Respondents profile

TOGETHER WE EMPOWER RURAL INDIA

- 55% of respondents are Muslim and 45% are Hindu
- 55% belong to Other Backward Caste (OBC), followed by General (38.3%) and Scheduled Caste (4%)
- Family structures is primarily nuclear(73.3%)
- 93.3% of respondents belong to Above Poverty Line (APL)
- The average land holdings of the farmers is 5 acre
- 15% of the farmers are illiterate

Note: Majority of the farmers (57%) have1 to 3 acres of land and only 5% farmers have 20 to 32 acres of land, others have between 4 to 12 acres of land

Ownership…



- ✓ 28% of farmers do not have bore wells & submersible
  - ✓ They depend on purchase water for the purpose of irrigation

Note: Bore wells generally run through diesel and submersibles through electricity

✓ Only 5% of farmers having submersible and 67% have bore wells

✓The average depth of the bore wells is 37 feet

✓ The average distance of the bore wells from the laser leveled land is 126 meter

✓ The average depth of submersible is 146 feet

✓ Average distance of submersible from the laser leveled land is 1666 meter

Sell and Purchase water…

TOGETHER
WE EMPOWER
RURAL INDIA

- Dependency on purchase water for the purpose of irrigation is 45%*
- Purchasing water from the same village is a common phenomenon (100%)
- The average distance of the source of purchased water is 309.25 meter
- The average hours for irrigating the field through purchase water is 16 hours (one time)

Note: Water purchased by both the categories of farmers who owns bore wells and who do not own bore wells

Cont…

TOGETHER
WE EMPOWER
RURAL INDIA

- The average cost of purchased water per acre for wheat is INR 1523 and mustard is INR 1495

- Of them, only 20% of farmers had sold water for 12 acres of land for the purpose of irrigation in last year

- The average cost of sold water per acre for wheat and mustard is INR 600

Note: The difference between purchase and sold water is due to the additional cost of diesel included by the water purchasers

Amount of seeds and yield

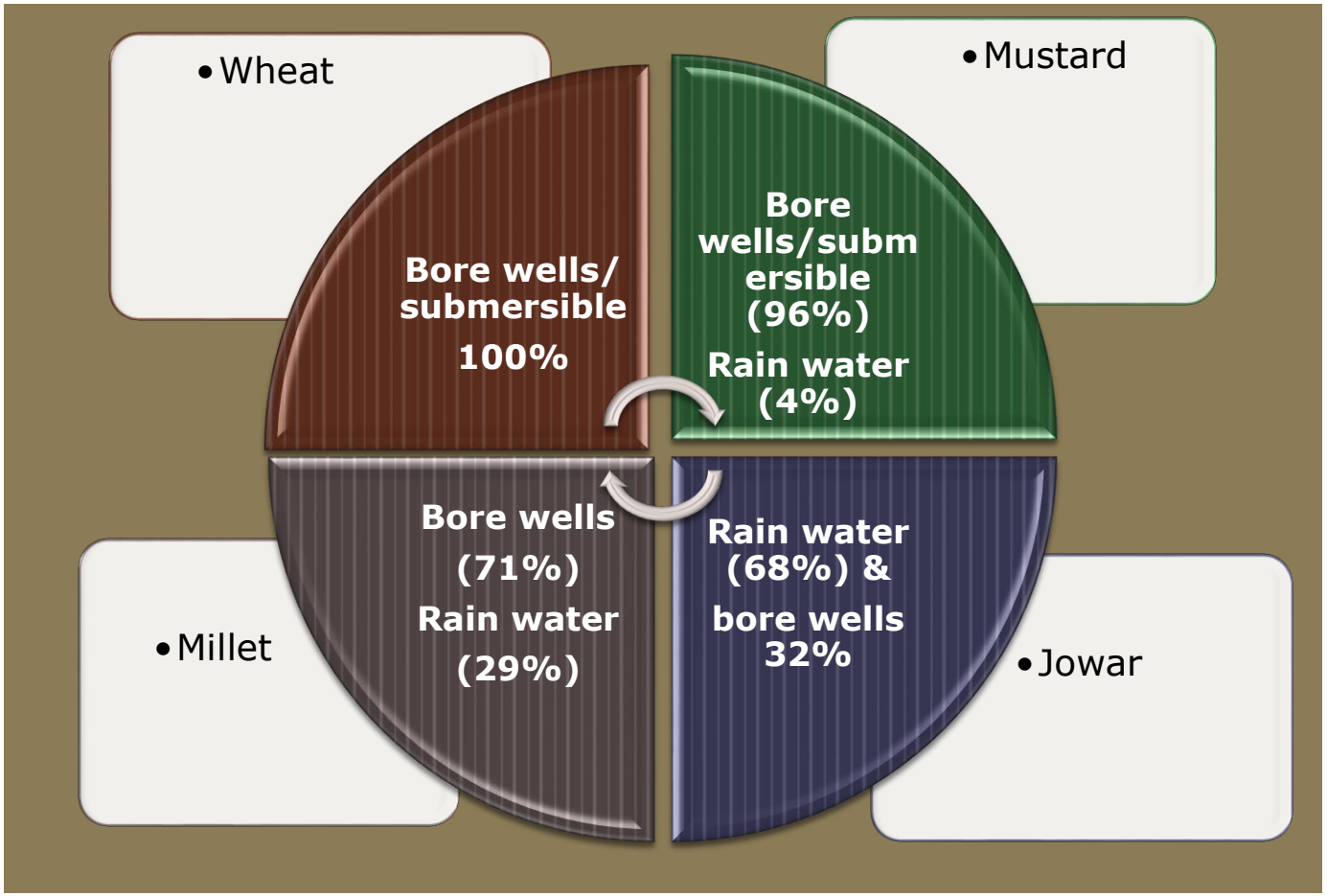
TOGETHER WE EMPOWER RURAL INDIA

Average amount of seeds & yield	Wheat N= 32	Mustard N=28	Millet N=7	Jowar N=22
Cropped area (Acre)	32	28	7	22
Amount of seeds sowed (per acre/ per kg)	54.04	2.25	2	23.7
Average yield per acre (quintal)	18.31	8.71	7	---

Note: Some farmers from highly saline water area said that they had sown 80 to 85 kg of wheat seeds. Other wise the modal value of sowing seeds in the area is 45kg
Jowar largely used for the purpose of fodder, therefore 0 yield has been shown in the table

Water sources

TOGETHER
WE EMPOWER
RURAL INDIA



Input in Irrigation

	Wheat	Mustard	Millet	Jowar
Average hours of irrigation (hrs) (One time)	14	15	11	14.5
Average number of irrigation (no of time)	5	1.3	1	1.4
Average Irrigation cost (purchase)	N= 10 5380	N=13 784	733	1050
Average irrigation cost (own source)	3154	925	566	236

- Cost of purchase water for wheat irrigation is higher than those who have own water sources. Because only the diesel cost has been considered for them

- In contrast, the cost of irrigation for mustard is higher of those who have own water source because they prefer to irrigate the mustard field more than once.

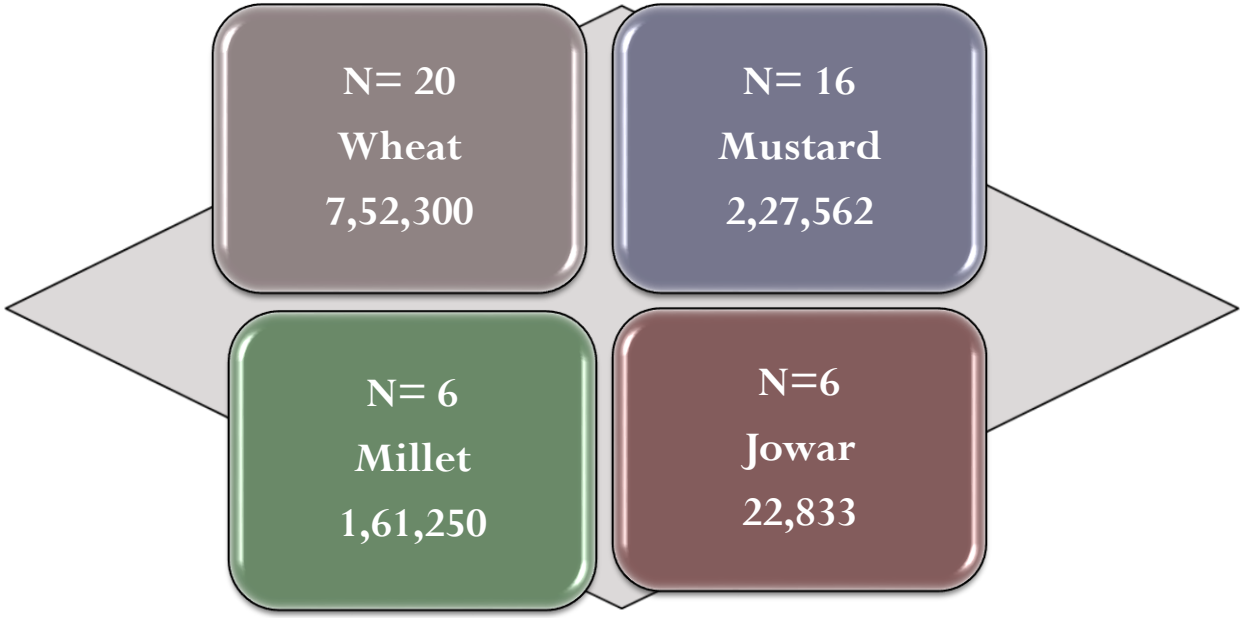
Amount of water

TOGETHER WE EMPOWER RURAL INDIA

Of total respondents having bore wells, 90% could be able to respond the question on amount of water

- Almost all the villagers having bore wells have the diesel pump with a capacity of 8 HP
- 91% of the pipe size is 4 inches

Approximate amount of water spent on the particular land (liter)



Limitation: Measurement of water is a highly technical matter. It depends on many other factors like the size of the pipe, distance of the tube wells and the capacity (HP) of the pump etc. The above calculation has been done through considering all those factors. In addition, to know the amount of water, discussion held with different groups (farmers, water sellers, water buyers and owner of tube wells) to know unit of water consumed per acre per time

Labour input crop wise

TOGETHER WE EMPOWER RURAL INDIA

Labour input for Sowing (Average)

	Wheat N=32	Mustard N=28	Millet N=7	Jowar N=22
Sowing done by labourers	3.2	7.2	0	0
Number of people involved	1	1	1	1
Time consumes in sowing (Minute)	51	40	34	40
Expenses	312	305	311*	326*

Note: Generally sowing of wheat (96.8%) and mustard (92.8%) is done through machines and millet and Jowar by self (100%)

* Plowing done by tractor after sowing of seeds and hence cost mentioned

Cont...

TOGETHER WE EMPOWER RURAL INDIA

Labour cost for the purpose of irrigation (Average)

	Wheat N=32	Mustard N=28	Millet N=7	Jowar N=22
Irrigation done by labourers	3.2	14.3	_____	____
Number of people involved(modal value)	1	1	1	1***
Hours of work	13.75	14.7	11	13
labour cost in irrigation	400	637	-----	----

Millet: 71.4 % (self) and 28.6% (rain fed)
Jowar: 72.7% (rain fed) and 27.3% (self)
Average labour cost for wheat has been counted from 2 (N=2)
*** of those who had irrigated Jowar

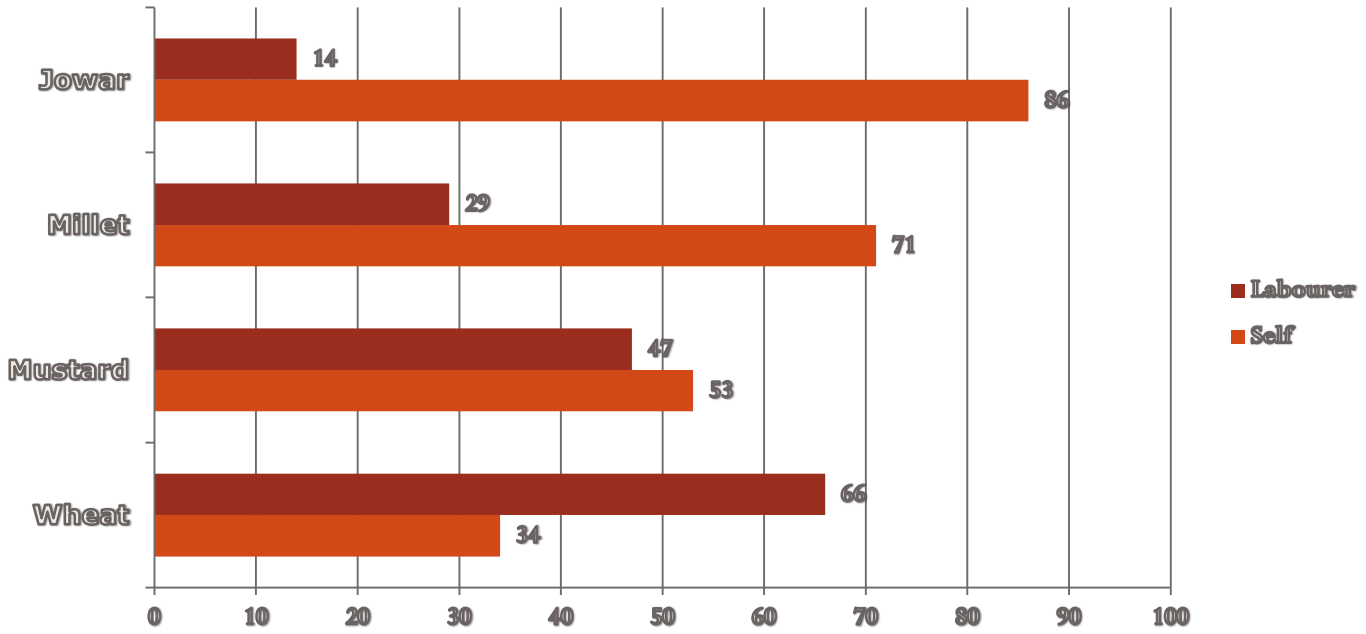
Labour Input in weeding

- 87.5% of wheat field were not weeded during the past season
- 12.5% farmers had weeded the field by their own
- The average hours they had worked in the field was 2 hours
- Weeding was not done for other crops i.e. mustard, millet and jowar

Cont...

TOGETHER
WE EMPOWER
RURAL INDIA

Labour Input in crop Harvesting



Labour employment for the purpose of wheat and mustard harvesting is higher than the millet and jowar

Cont…

TOGETHER WE EMPOWER RURAL INDIA

Labour Input in Harvesting (Average)

	Wheat	Mustard	Millet	Jowar
Numbers of people involved	4	4	2	3
Hours of work	20.5	19.2	18	54
Labour cost	3219	….	---	…

- Labour input for Millet and Jowar for the purpose of harvesting is very rare in the farming landscape of Mewat

- 66% of farmers had employed labourers for harvesting of wheat and 46.4 for harvesting of mustard.

- For mustard labourer are not paid by cash. Generally they carry the mustard wood (after harvesting) for the purpose of cooking fire.

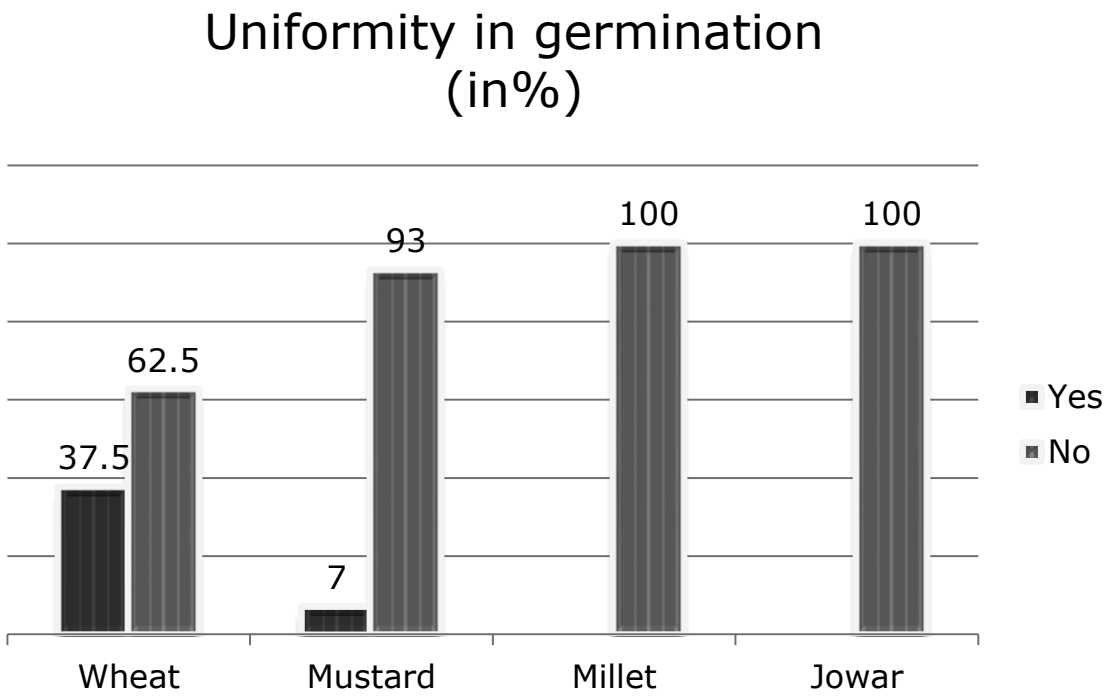
Chemicals input

TOGETHER WE EMPOWER RURAL INDIA

Chemicals/ fertilizers	Wheat (kg)	Mustard (kg)	Millet (kg)	Jowar (kg)
Urea	(N=31) 99	(N=25) 45.2	(N=7) 47	(N=21) 43
DAP	(N=31) 48.59	(N=25) 46	(N=4) 21.3	(N=3) 15
K.meg	(N=3) 20	N=3) 20	--	--
Zink	(N=3) 10		---	---
Sulpher	Used for mustard only and only 2 farmers had used it 1-5 kg , 1= 1.5 kg			
Boron	Used for mustard and only 2 farmers 2kg each had used it			

Existing scenario of germination

TOGETHER WE EMPOWER RURAL INDIA

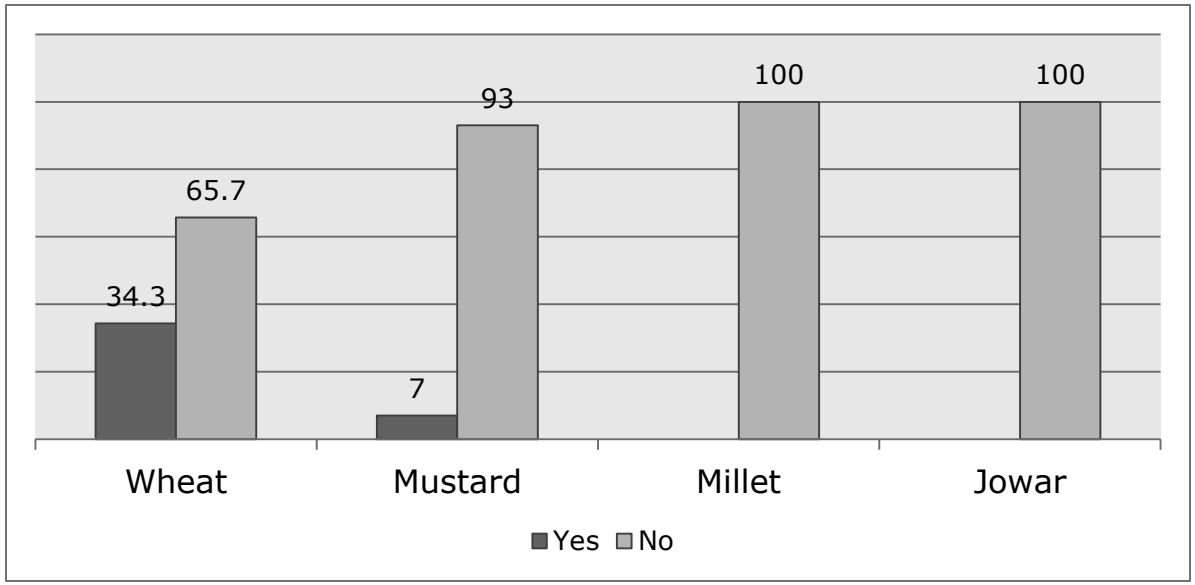


- In general, people belief that there is no uniformity in germination and the percentage is higher in millet and jowar (100%) than wheat and mustard
  - land leveling through tractors is generally done for wheat and mustard crops

Existing scenario of crop maturity

TOGETHER
WE EMPOWER
RURAL INDIA

Uniformity in crop maturity (%)



- Uneven crop maturity is found to be a common phenomenon in respect to all the crops

- 34.3 of farmers reported for uniform crop maturity in case of wheat.

Land Leveling Details

- 51.7% of farmers reported that they had labeled their land prior to sowing seeds
- Of them 58% had developed their land in 2015
- Land leveling was done by the tractor (100%)
- The average hours of leveling the land through tractor was 5.6 hours
- In total 82 acres of land of 31 farmers had been leveled through tractors (non-laser)

- The average cost of land leveling through tractor is INR 426.82. However those who have their own tractors had spent only diesel cost. Those who do not have tractors had spent an amount of Rs 700 to 1500 /-
- Of them who had done land leveling, 66% realized the quality was average followed by 23% as good and 10% as bad
- 83% believe that laser leveling would be a better option to make the land even accurately

Conclusion

TOGETHER
WE EMPOWER
RURAL INDIA

- Keeping the objectives of Laser land leveling, the existing scenario of water consumptions, labour input, germination & crop maturity status have been collected. Major findings of the study as follows:
- Water consumptions for wheat is comparatively higher than other crops i.e mustard, millet and Jowar.
- Labour input for the purpose of harvesting is found to be comparatively higher than other activities i.e. Sowing, Irrigation and weeding
    - For wheat and mustard sowing is largely done by machines and Jowar and millet by the farmer himself

Cont…

- Irrigation largely done by farmers himself. Jowar is a rain fed crop which do not require irrigation
- Only 12.5% of wheat land were weeded in the past season
- Urea and DAP is mostly used by the farmers for all the crops. Only few farmers who have a good amount of land use K. Meg, Sulpher and Boron.
- As per farmers, uniformity in seed germination and crop maturity is very poor due to the uneven land
- 51.7% of farmers had leveled their land through non digitally in the year of 2015
- As per the perceptions of farmers the land leveling was not done accurately