

# Investigating Rice Seeds Sold by Dealers in Eastern India: Evidence using DNA Fingerprinting

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# Seed Bags Sampling from Dealers

## Collection of Seed Samples from Dealers

- Bihar and Eastern Uttar Pradesh
- Districts were chosen from different abiotic-stress prone areas
- Ten dealers were chosen from each district
- 3 seed samples (bags) were randomly selected from each dealer
- **Total of 577 samples from 200 dealers**

## Collection of Breeder Seed Samples

- 207 Samples from Ag. Research Institutes and Seed Firms
- 61 Varieties (3.4 samples per variety)

# DNA Fingerprinting

1. Seed collection
2. Germination
3. Leaf sampling
4. Packing/shipping
5. DNA extraction
6. Gynotyping (Illumina – Infinium 6K platform: more than 4K SNPs usable)
7. Analysis (identification)

**India**  
577 dealer samples  
207 breeder samples

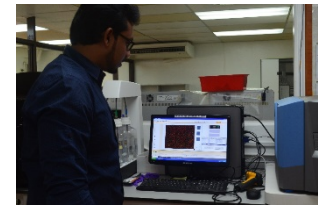
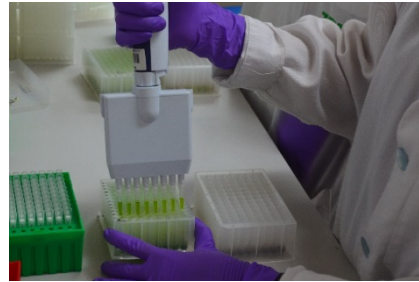
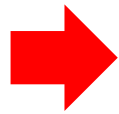
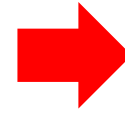
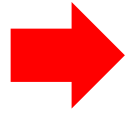


**SciGenome**



**IRRI GSL**

# Seed Collection & Germination



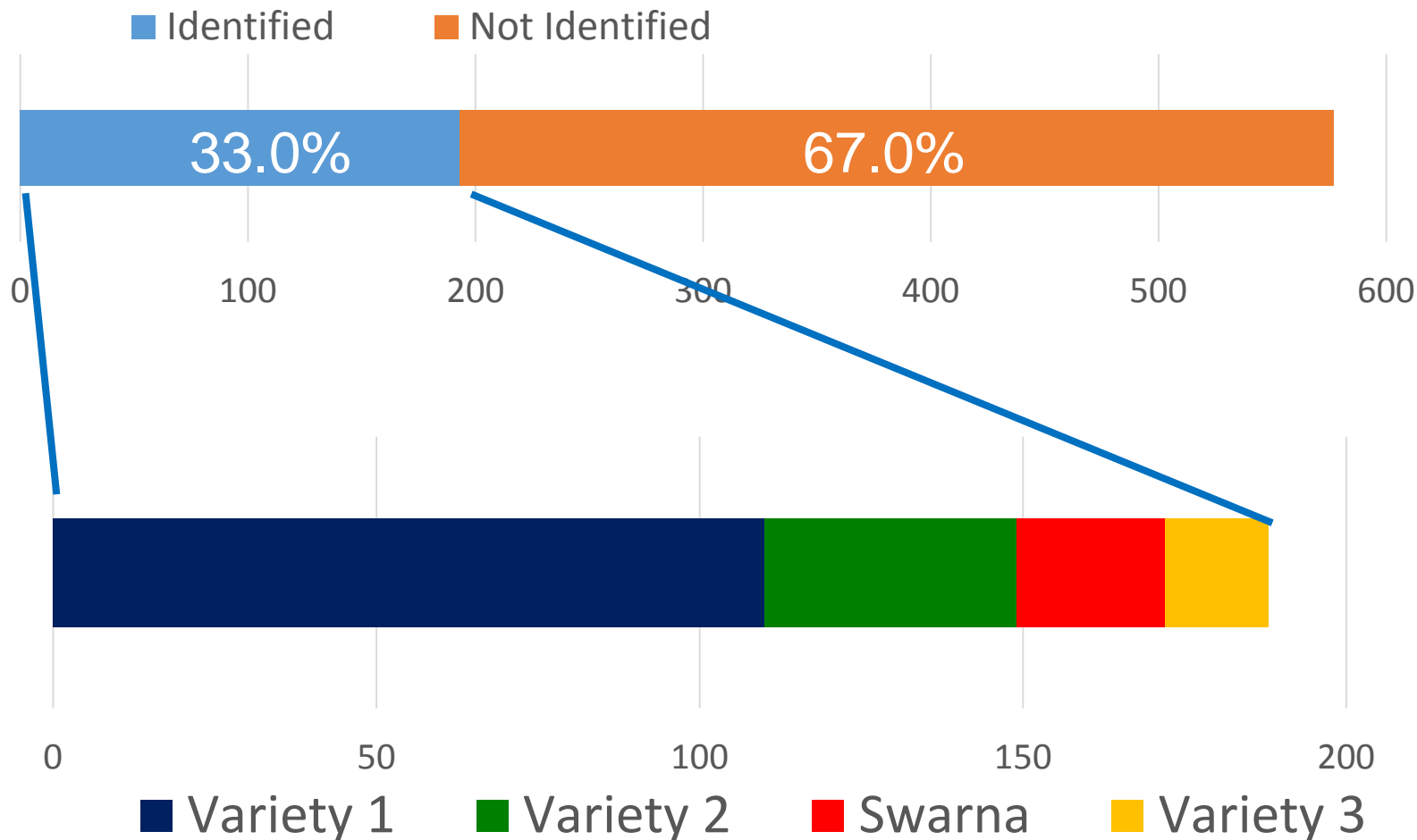


Figure 1. DNA Results on Seed Varieties from Dealers

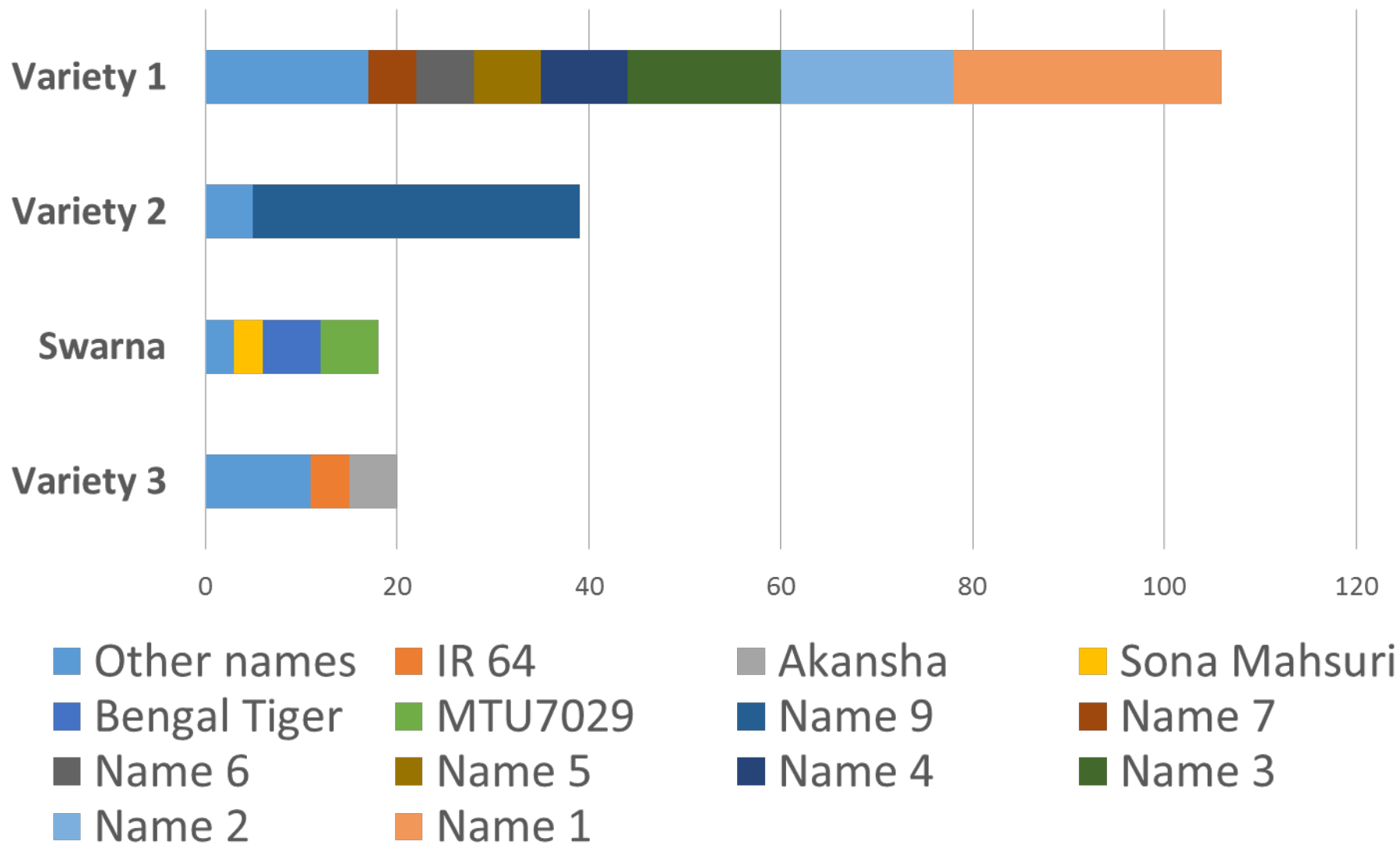


Figure 2. Farmer Names on Identified Varieties

Breeder Variety name (cases)	Number of samples	Match	Variety names used by dealers
	(A)	(B)	(C)
	Number	%	Name (Number)
Variety 1 (110)	101	100	Name 1 (28), Name 2 (18), Name 3 (13), Name 4 (9), Name 5 (7), Name 6 (6), Name 7 (5), 11 other names
	6	99	Name 3 (3), 3 other names
	2	98	2 names
	1	96	1 name
Variety 2 (39)	27	100	Name 9 (24), 1001 (2), Prithvi (1)
	5	99	Name 9 (5)
	5	98	Name 9 (3), Jaya (1), Pant12 (1)
	1	97	Name 9 (1)
	1	96	Name 9 (1)
Swarna (23)	18	98	MTU 7029 (6), Bengal Tiger (6), Sona Mansuri (3), 3 other names
	5	97	MTU 7029 (2), Bengal Tiger (1), 2 other names
Variety 3 (16)	14	100	Akansha (5), IR64 (4), 5 other names (9)
	2	99	NC (1), UN-5050 (1)
Unidentified samples	384 (67.0%)		

## 100% Match?

Defined as 99.5% - 100.0% match over 4K SNPs

means that 20 SNPs could be different.

Thus, it is possible for two varieties to be matched 100%.

We are differentiating at the tenth level below the decimal point.

(Even 100.0% covers only a fraction of the entire sequence though.)



## Findings and Next Steps

- Varieties are sold under various brand names. >>> The actual variety variation is much smaller than what variety brand names suggest.
- Out of 61 varieties from breeders, only six varieties found matches among dealer samples. We need to investigate more.
- The seed industry needs a more rigorous monitoring system, such as registering new varieties with DNA fingerprinting.