INTERNATIONAL CROP INFORMATION SYSTEM
Overview

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Outline

- What is ICIS?
- Components of ICIS
  - Genealogy Management System (GMS)
  - Data Management System (DMS)
  - Inventory Management System (IMS)
  - Gene Management System
- Dispersed Data Curation and Privacy
- Benefits of using ICIS
- ICIS Users' Team
- What is IRIS?
  - Survey of the IRIS database
  - IRIS Web Application
- ICIS Resources

The International Crop Information System

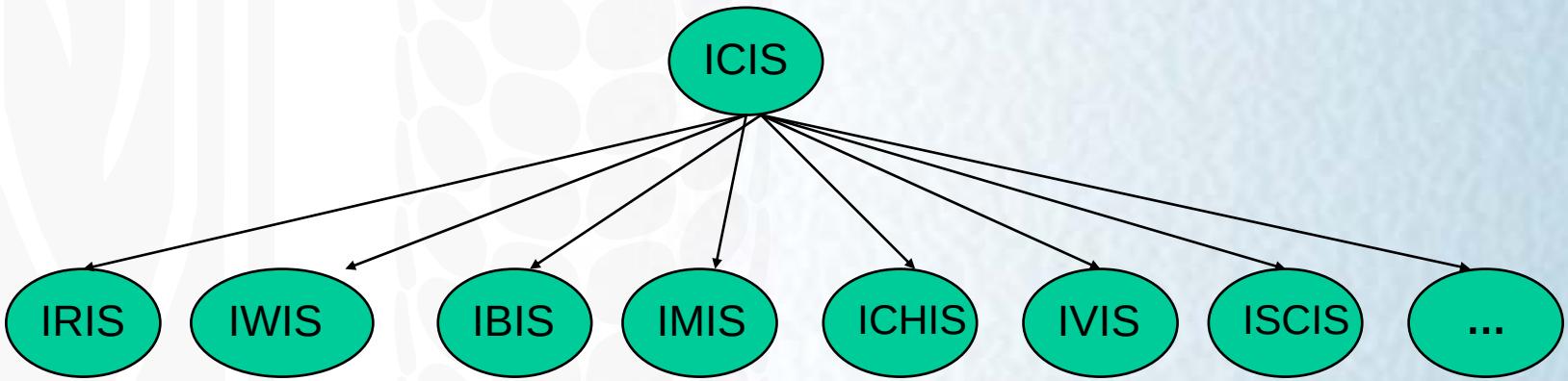
- ICIS is a computerized database system for general, integrated management and utilization of genealogy, nomenclature, evaluation and characterization data for a wide range of crops.

- ICIS is a public open source collaboration involving a number of CGIAR centers and non-CG partners.

What is ICIS? …

- ICIS is an empty shell which must be implemented for each crop individually

- Aside from rice ICIS is also deployed for: Wheat, Barley, Maize, Beans, Chick Pea, Cow Pea, and dozens of vegetable crops.



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ICIS COMPONENTS

PEDIGREE ANALYSIS SYSTEM

SET GENERATION MODULE

GENETIC RESOURCES INFORMATION SYSTEM

FIELDBOOK SYSTEM

GENEALOGY MANAGEMENT SYSTEM

GENE MANAGEMENT SYSTEM

INVENTORY MANAGEMENT SYSTEM

DATA MANAGEMENT SYSTEM

GIS APPLICATIONS

GxE ANALYSIS APPLICATIONS

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Components of ICIS

- Crop Data Management
  - Genealogy Management System (GMS)
  - Data Management System (DMS)
  - Inventory Management System (IMS)
  - Genetic Resources Information Management System (GRIMS)
- Genetics/Genomics (GEMS)
  - Adapting diverse public domain open source schemas & software: GMOD, Ensembl, GO, BASE plus in-house Perl/Java code, …
- Integrating with GIS and other data

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Genealogy Management System (GMS)

- GMS stores and manages information on genesis, genealogy, nomenclature and chronology of germplasm for a particular crop. It operates on the principle of unique identification of germplasm through system assigned Germplasm IDs

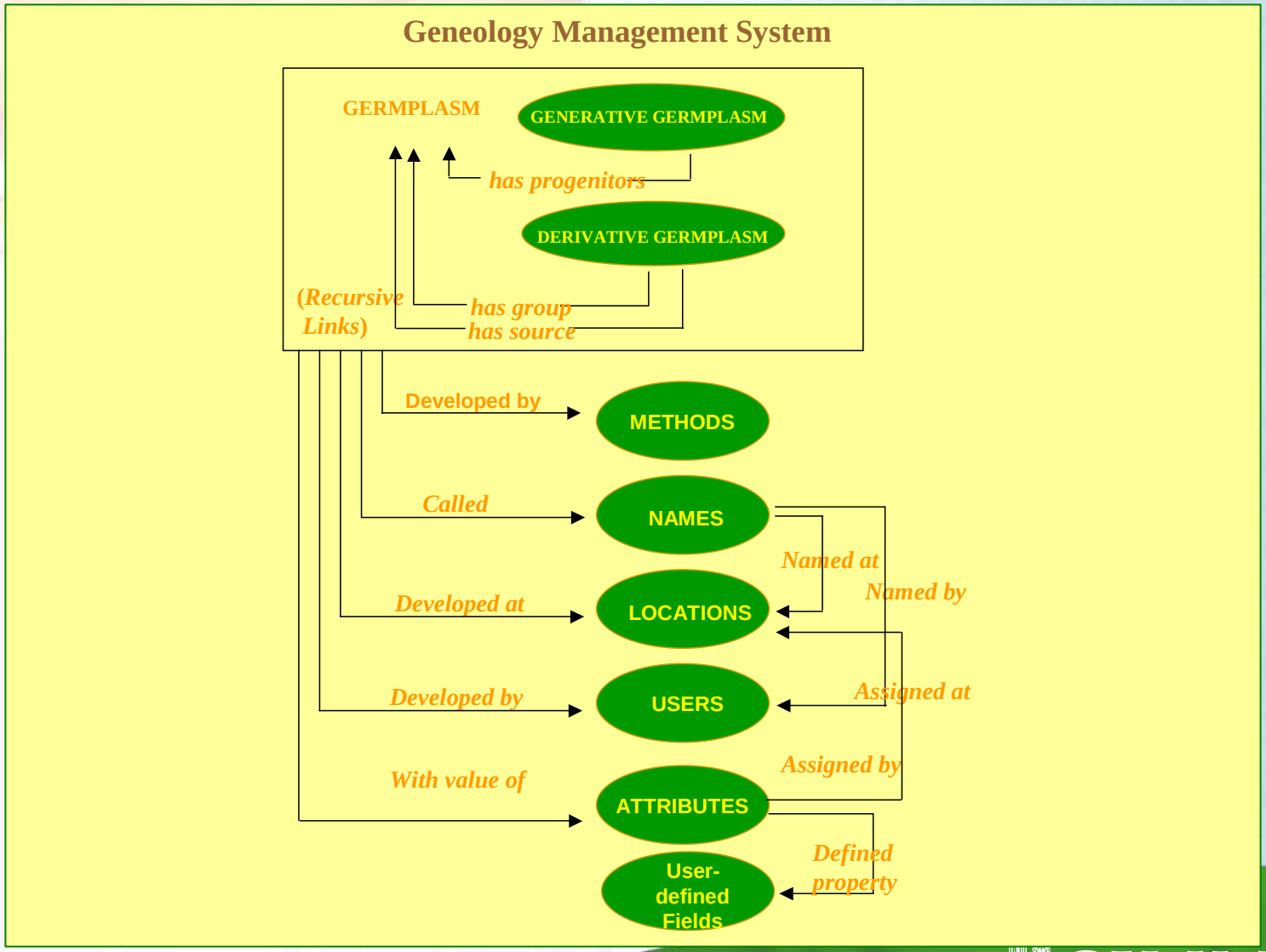
- It separates management of genealogy data from nomenclature so users are free to name germplasm as they like and the genealogy is always ‘computable’

Genealogy Management System

Structural Assumptions

- Accommodate all possible development methods
- Three development classes
  - Generative methods which increase genetic variability,
  - Derivative methods which focus variability,
  - Maintenance methods which retain genetic variability
- Germplasm can be classified into groups of derivatives from a specific generative process,
  I.e. all the lines from a cross

GMS Model

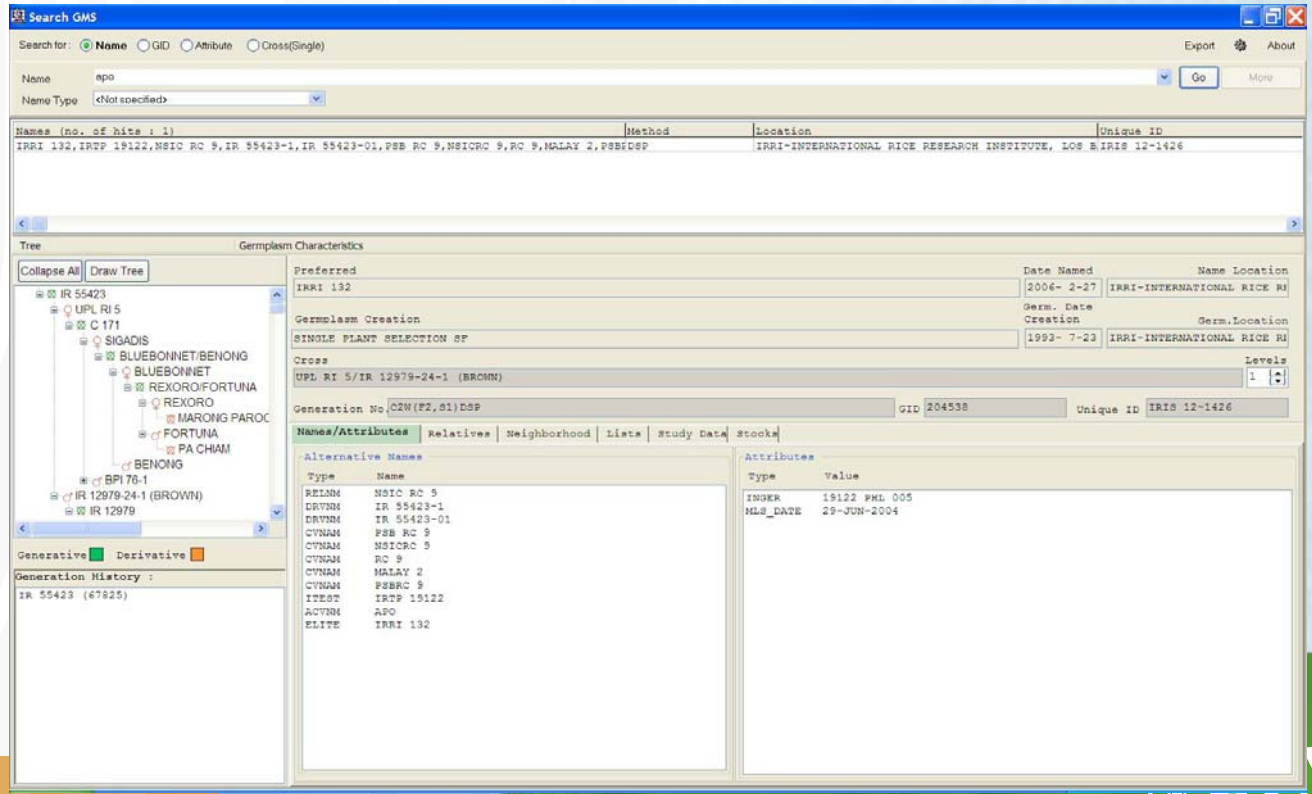

Geneology Management System
GERMPLASM
GENERATIVE GERMPLASM
has progenitors
DERIVATIVE GERMPLASM
(Recursive Links)
has group
has source
Developed by
METHODS
Called
NAMES
Named at
Named by
Developed at
LOCATIONS
Developed by
USERS
Assigned at
Assigned by
With value of
ATTRIBUTES
Defined property
User-defined Fields

GMS Applications

- Search Tool (GMS Search, Browse)
- Pedigree Input Tools (EPIT, GMS Input)
- Breeder's Tools (Set Generation)
- Analysis Tools (Coefficients of Parentage)

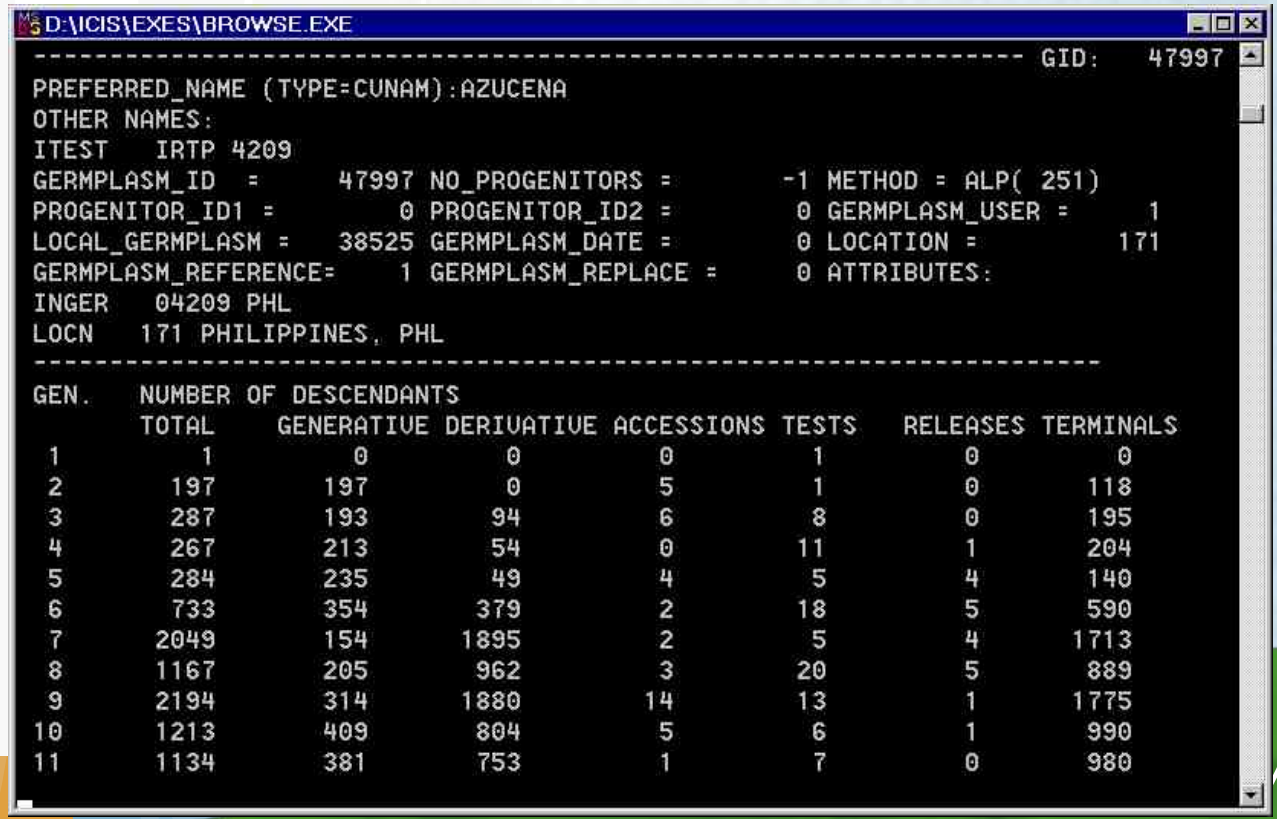
GMS Search

- The GMS SEARCH application is a tool for finding germplasm in the GMS, and displaying its corresponding information and/or any relevant information attached to it.



Browse

- It is a GMS application for viewing and changing GMS records. It can also compute the Coefficient of Parentage and display the mendelgram for the target germplasm.

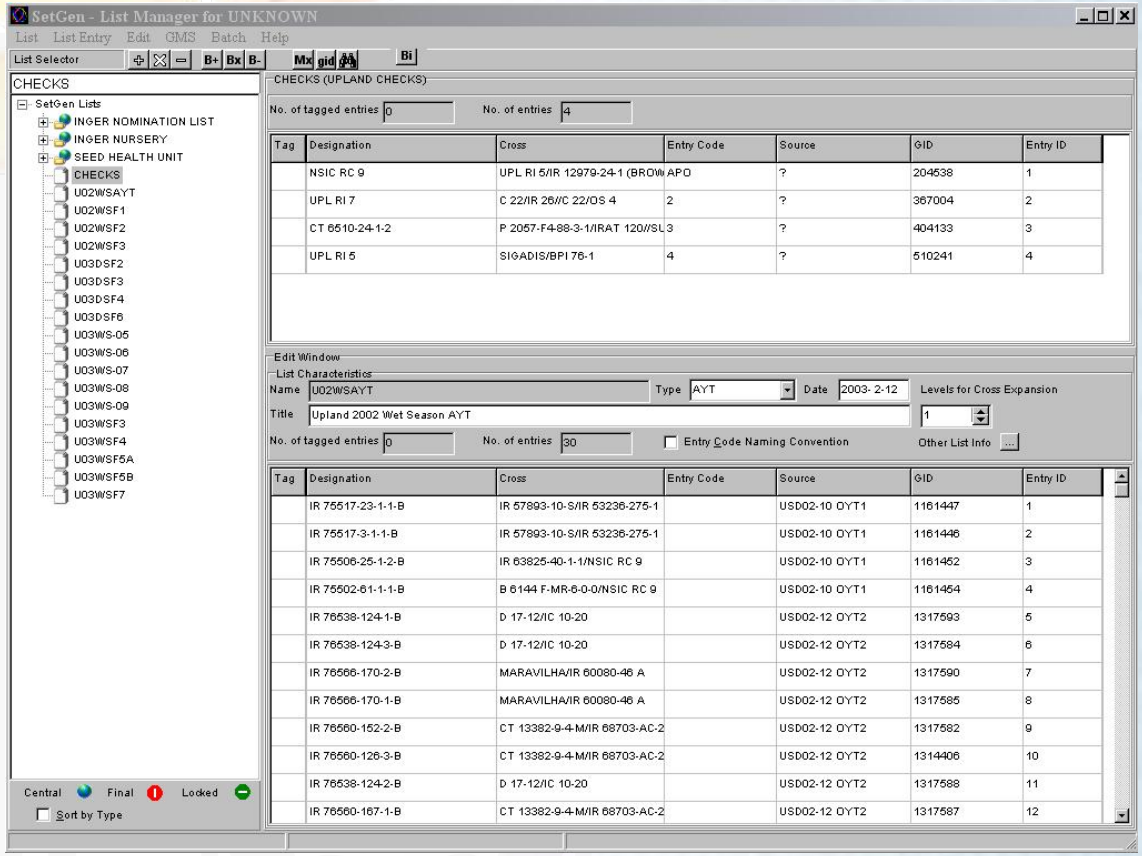


SETGEN

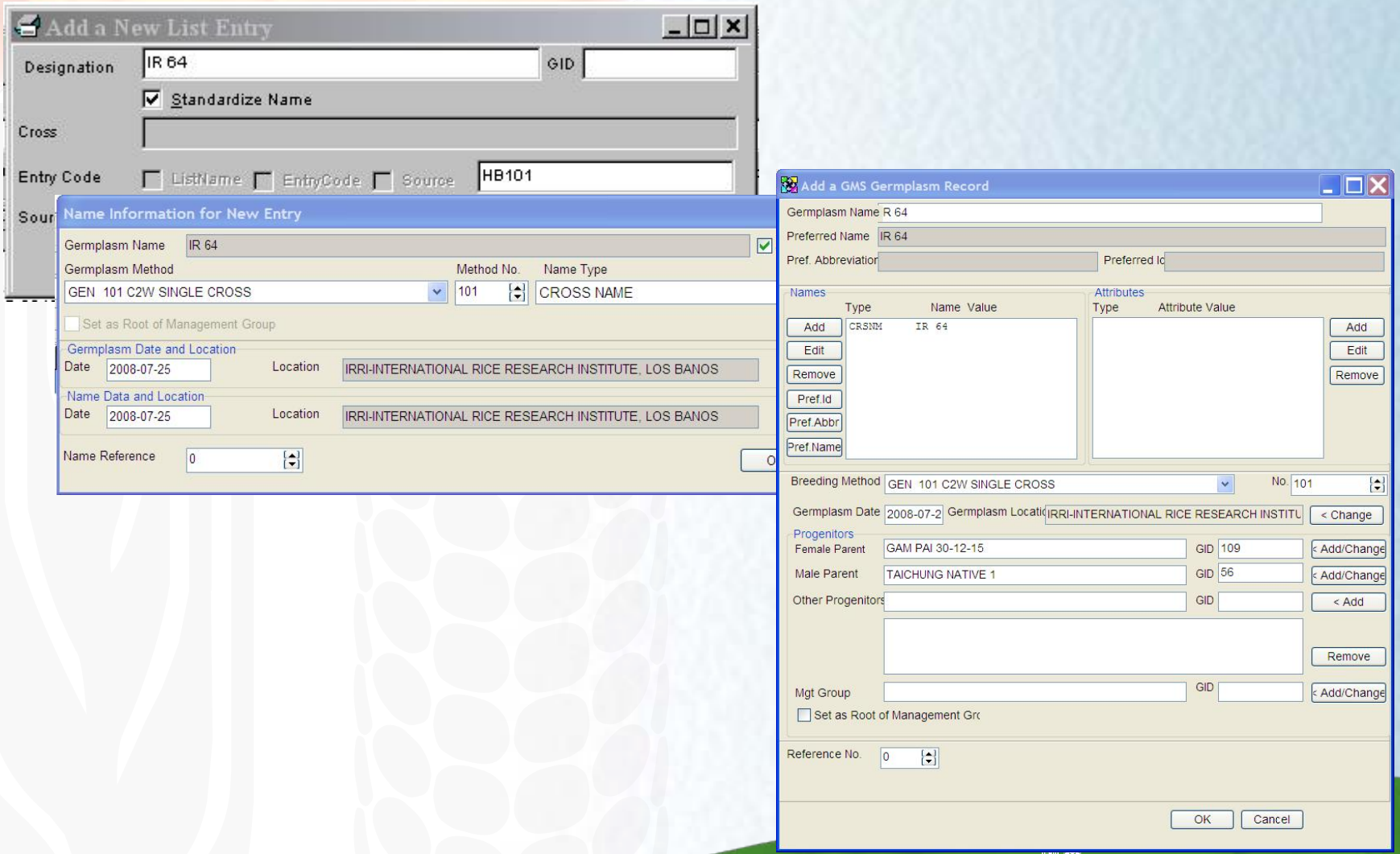
GMS application for managing lists of germplasm for breeding, characterization or evaluation

- genealogy
- nomenclature
- chronology

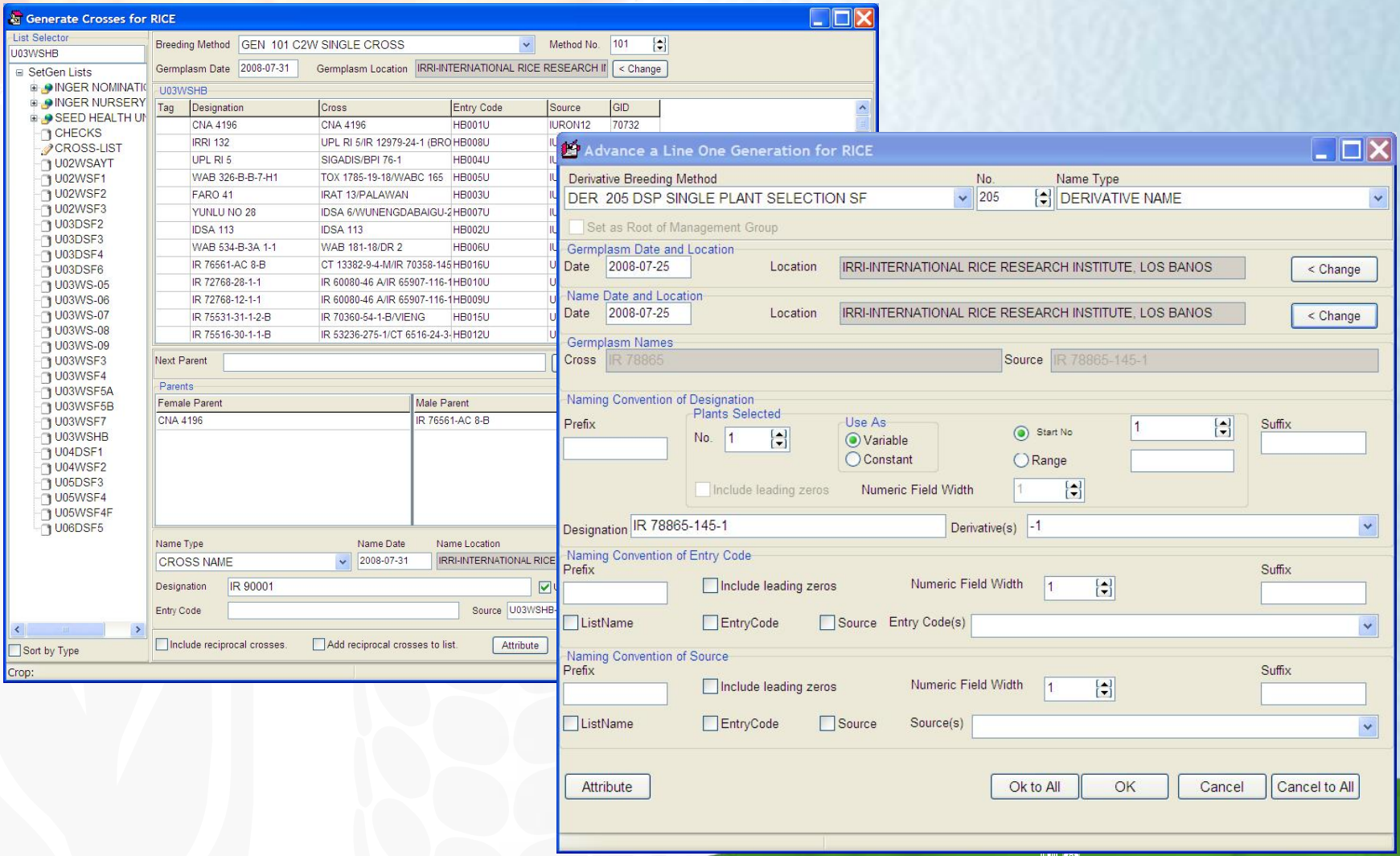
List Manager: germplasm list generator



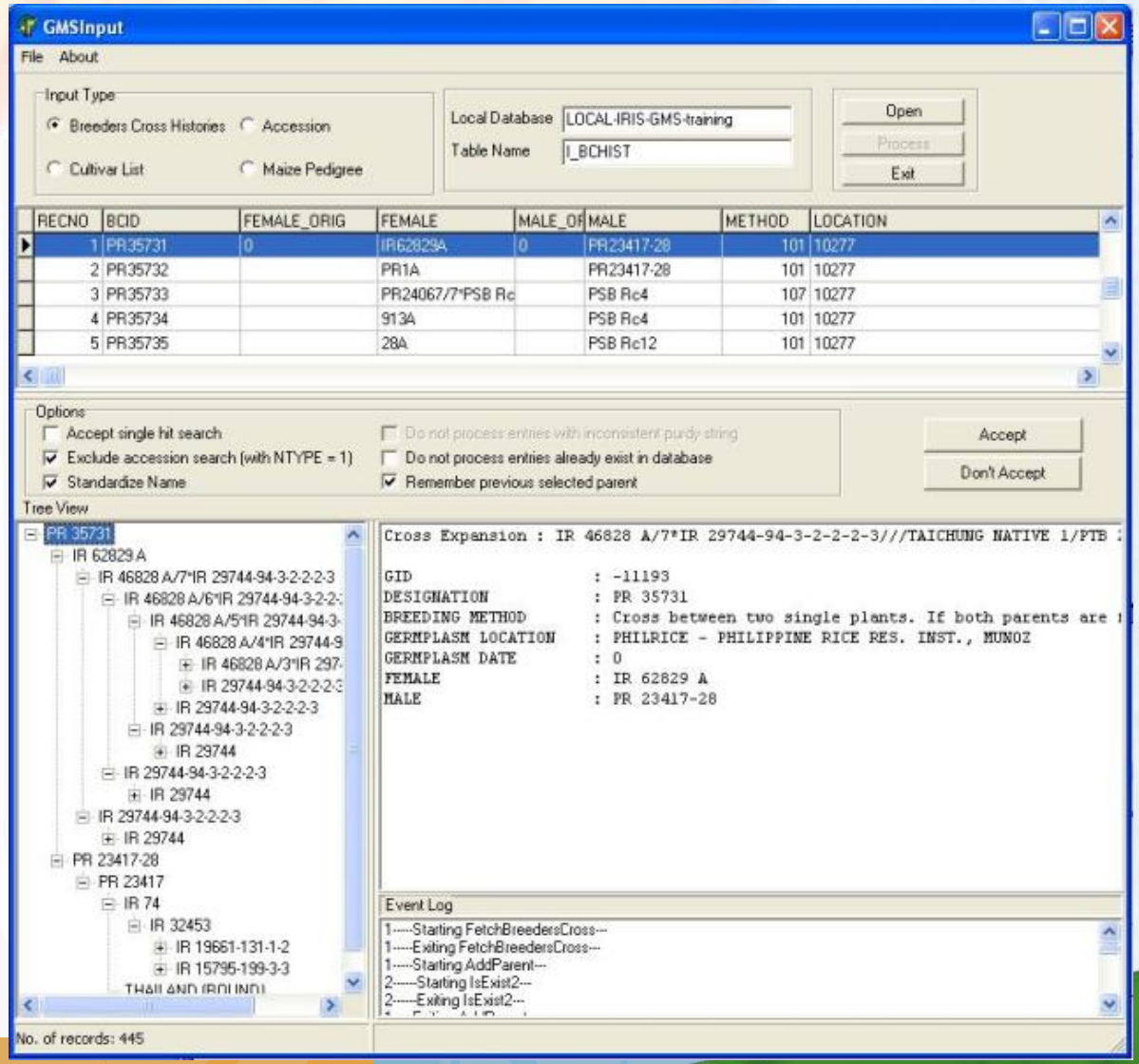
A. Generate basic lists



B. Generate cross or selections lists



GMS Input



- The GMSInput tool is an application for loading large volumes of historical germplasm data into GMS. The input tool loads cross, cultivar or accession data to a local database that can later be uploaded to the central

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Data Management System (DMS)

- DMS manages environmental data, germplasm characterization data and evaluation data for genetic resources and crop improvement projects.
- It is a data warehouse that accumulates and integrates data from a variety of sources.
- It handles any data structure and facilitates unambiguous annotation and linkage of data across studies via expandable controlled vocabularies

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Data Management System

Functions

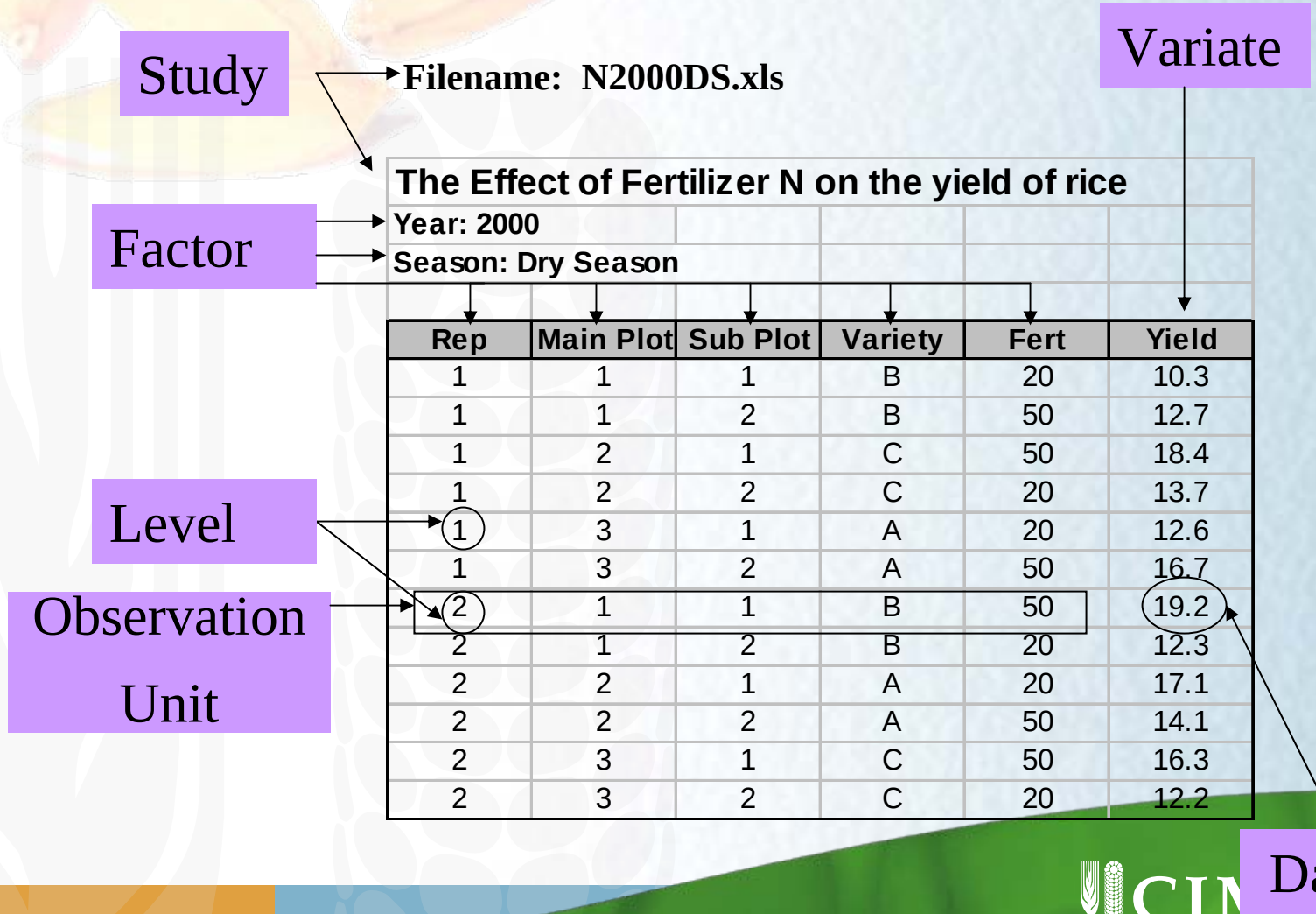
- Store structured germplasm evaluation and characterization data
- Document Data
- Link data to germplasm identifiers
- Link data to other descriptors (Locations, treatments, etc.)
- Facilitate structured searches

Data Management System

Structural Assumptions

- The data is collected in studies
- The data is in factorial structure
- Any experiment or survey design can be accommodated
- Multiple factorial hierarchies can be accommodated

Data Model of DMS



Rep	Main Plot	Sub Plot	Variety	Fert	Yield
1	1	1	B	20	10.3
1	1	2	B	50	12.7
1	2	1	C	50	18.4
1	2	2	C	20	13.7
1	3	1	A	20	12.6
1	3	2	A	50	16.7
2	1	1	B	50	19.2
2	1	2	B	20	12.3
2	2	1	A	20	17.1
2	2	2	A	50	14.1
2	3	1	C	50	16.3
2	3	2	C	20	12.2

Data Model ...

	Factor	Variate
	Fert	Yield
PROPERTY	***NITROGEN FERTILIZER***	***GRAIN YIELD***
SCALE	***kg/ha***	***t/ha***
METHOD	***Total Application***	***Paddy Rice***

Property, Scale and Method

•A property or trait is a measurable characteristic or feature of an experimental unit or experimental material (e.g., of a variety or environment), which is manipulated or measured in a study.

•Scale is the measurement unit a trait is expressed.

•A method is a technique of measuring or applying a trait.

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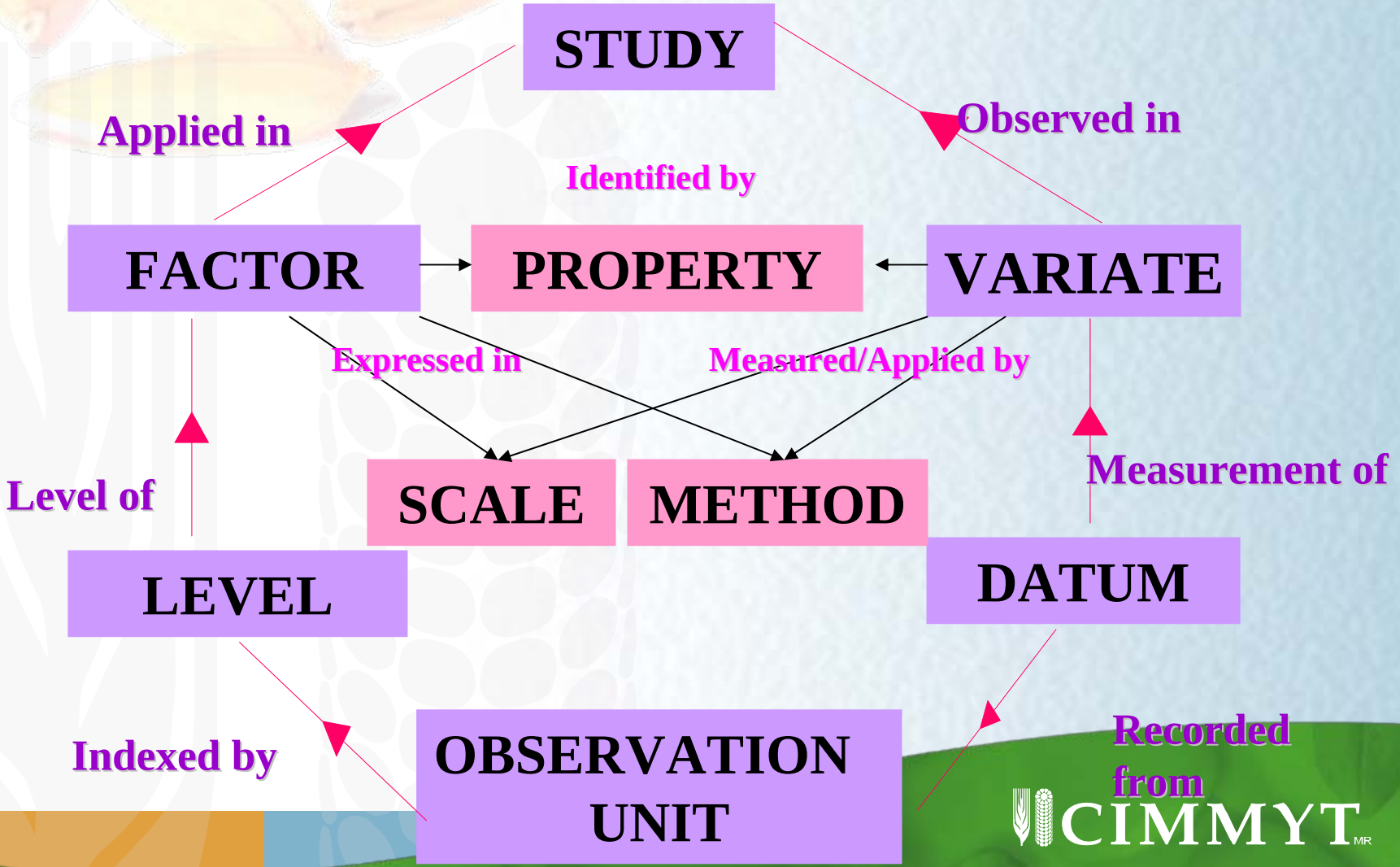
Data Model ....



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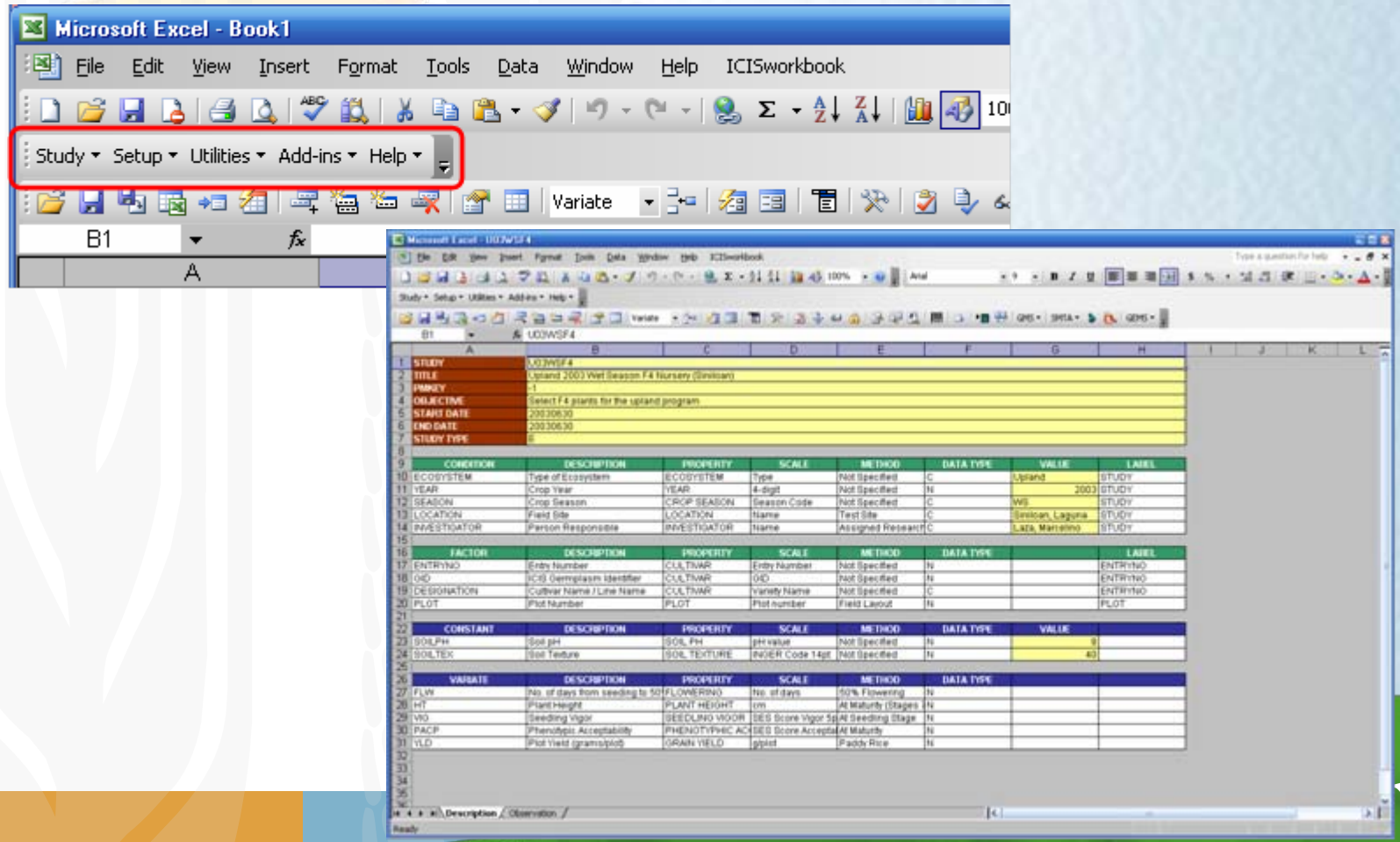
DMS Applications

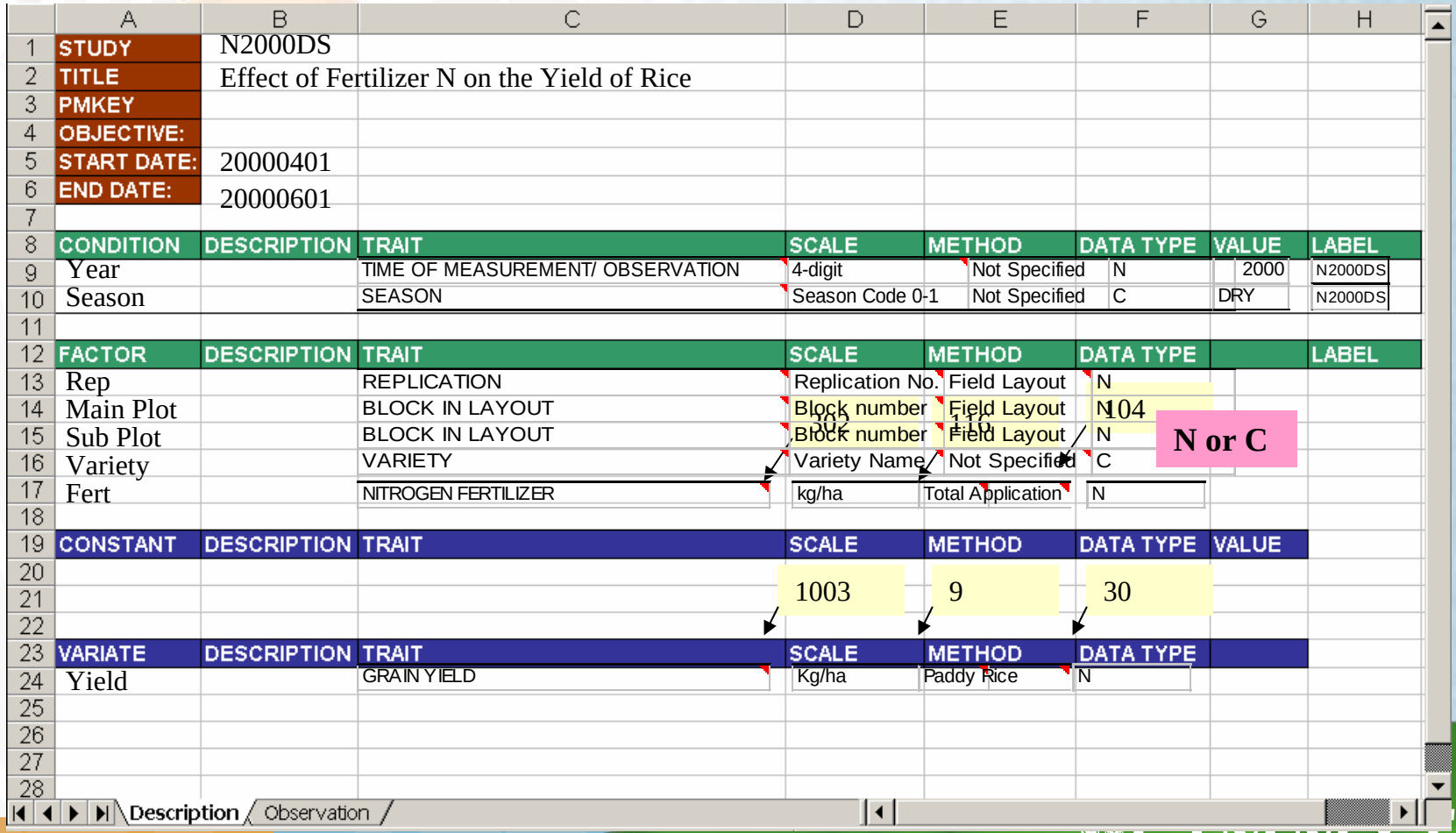
- DATA ENTRY TOOL
- DATA QUERY TOOLS

ICIS WORKBOOK

The ICIS Workbook is a flexible tool for entering and retrieving evaluation, nursery trial, crop improvement data and even molecular data.



Workbook File (Description Sheet)



	A	B	C	D	E	F	G	H
1	STUDY	N2000DS						
2	TITLE	Effect of Fertilizer N on the Yield of Rice						
3	PMKEY							
4	OBJECTIVE:							
5	START DATE:	20000401						
6	END DATE:	20000601						
7								
8	CONDITION	DESCRIPTION	TRAIT	SCALE	METHOD	DATA TYPE	VALUE	LABEL
9	Year		TIME OF MEASUREMENT/ OBSERVATION	4-digit	Not Specified	N	2000	N2000DS
10	Season		SEASON	Season Code 0-1	Not Specified	C	DRY	N2000DS
11								
12	FACTOR	DESCRIPTION	TRAIT	SCALE	METHOD	DATA TYPE		LABEL
13	Rep		REPLICATION	Replication No.	Field Layout	N		
14	Main Plot		BLOCK IN LAYOUT	Block number	Field Layout	N	104	
15	Sub Plot		BLOCK IN LAYOUT	Block number	Field Layout	N		
16	Variety		VARIETY	Variety Name	Not Specified	C		
17	Fert		NITROGEN FERTILIZER	kg/ha	Total Application	N		
18								
19	CONSTANT	DESCRIPTION	TRAIT	SCALE	METHOD	DATA TYPE	VALUE	
20								
21				1003	9	30		
22								
23	VARIATE	DESCRIPTION	TRAIT	SCALE	METHOD	DATA TYPE		
24	Yield		GRAIN YIELD	Kg/ha	Paddy Rice	N		
25								
26								
27								
28								

Description | Observation

N or C

Description Sheet

Workbook File . . .

columns of variate names

observation range

RowTag

	A	B	C	D	E	F	G	H
1	Rep	Main Plot	Sub Plot	Variety	Fert	Yield		Row Tag
2					kg/ha	t/ha		1
3	1	1	1	B	20	10.3		
4	1	1	2	B	50	12.7		
5	1	2	1	C	50	18.4		
6	1	2	2	C	20	13.7		
7	1	3	1	A	20	12.6		
8	1	3	2	A	50	16.7		
9	The next block is the second replication							1
10	2	1	1	B	50	19.2		
11	2	1	2	B	20	12.3		
12	2	2	1	A	20	17.1		
13	2	2	2	A	50	14.1		
14	2	3	1	C	50	16.3		
15	2	3	2	C	20	12.2		
16								
17								
18								
19								
20								
21								
22								
23								
24								

Description | Observation

- **column for marking rows that do not contain data to be loaded to DMS**
- **the tag is any number except 0**

Observation Sheet

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Sample Workbook Files

	A	B	C	D	E	F	G	H
1	STUDY	OYT2000WS						
2	TITLE	Observational Yield Trial 2000 Wet Season						
3	PMKEY	1						
4	OBJECTIVE	-						
5	START DATE	0						
6	END DATE	0						
7	STUDY TYPE	E						
8								
9	CONDITION	DESCRIPTION	PROPERTY	SCALE	METHOD	DATA TYPE	VALUE	LABEL
10	SEASON		CROP SEASON	Season Code 0-1	Not Specified	N	1	STUDY
11	YEAR		MONTH	Year (YYYY)	Not Specified	N	2000	STUDY
12	NURSERY		NURSERY	Nursery Type	Not Specified	C	OYT	STUDY
13								
14	FACTOR	D						
15	ENTRYNO							
16	DESIGNATION							
17	SOURCE							
18	GRPNO							
19	GID							
20								
21	CONSTANT	D						
22								
23	VARIATE	D						
24	LODGING	LODGING						
25	TILLER	NO. OF T						
26	PLTHGT	PLANT HI						
27	MATURITY	DAYS TO						
28	FLW	DAYS TO						
29	GRNELON	GRAIN EL						
30	AROMA	AROMA						
31	BB1_S	Bacterial						
32	BB1	BACTERI						
33	BLAST	BLAST						
34	GLH	GREEN L						
35	CHALK	CHALKIN						
36	GRS	GRAIN W						
37	GRNLTH	GRAIN LE						
38	GELTEMP	GELATINI						

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	ENTRYNO	DESIGNATION	SOURCE	GRPNO	GID	LODGING	TILLER	PLTHGT	MATURITY	FLW	GRNELON	AROMA	BB1_S	BB1	BLAST	GLH	CHALK	GRS	GRNLTH	GELTEMP	AMYLOSE		ROWTA
2	A8354	IR 77470-1-7-2-5-2	T19694		846540	1	13	97	116	82				7		9							
3	A8353	IR 77470-1-7-2-4-5	T19692		846541	1	13	102	112	80				7		9							
4	A8352	IR 77470-1-7-2-4-4	T19691		846542	1			115	83				7		9							
5	A8351	IR 77470-3-3-4-5-2	T19690		846543	1	12	95	112	78				7		9							
6	A8349	IR 77470-3-3-4-5-1	T19689		846544	1	12	100	112	80			S			9							
7	A8348	IR 77470-3-3-4-4-2	T19688		846545	1	14	97	109	78				7		9							
8	A8347	IR 77470-3-3-4-4-1	T19686		846546	1	13	101	109	78				7		9							
9	A8346	IR 77470-3-3-4-1-2	T19686		846547	1	14	97	109	78				7		9							
10	A8345	IR 77470-3-3-4-1-1	T19685		846548	1	14	95	109	78				7		9							
11	A8344	IR 77470-3-3-3-4-2	T19684		846549	1	13	98	109	78				7		7							
12	A8343	IR 77470-3-3-3-4-1	T19683		846550	1	13	97	108	77				7		9							
13	A8342	IR 77470-3-3-3-2-2	T19682		846551	1	13	97	109	78				7		9							
14	A8341	IR 77470-3-3-3-2-1	T19681		846552	1	14	94	109	79				7		9							
15	A8340	IR 77469-4-3-4-1-1-1	T19680		846553	1	14	94	112	81				7		9							
16	A8339	IR 77469-4-2-3-1-5-2	T19679		846554	1	15	95	112	82				7		9							
17	A8338	IR 77469-4-2-3-1-5-1	T19678		846555	1	13	96	112	82				7		9							
18	A8337	IR 77469-4-2-3-1-3-2	T19676		846556	1	13	93	111	80				7		9							
19	A8336	IR 77469-4-2-3-1-2-2	T19675		846557	1	12	95	112	82				7		9							
20	A8335	IR 77469-4-2-3-1-2-1	T19674		846558	1	13	94	112	81				7		9							
21	A8331	IR 77968-2-10-3	T19658		846505	1			119	84				1		7							
22	A8330	IR 77968-2-10-1	T19657		846507	1			117	82				1		5							
23	A8329	IR 77968-2-6-2	T19653		846506	1			116	82				1		9							
24	A8328	IR 77468-6-4-5	T19648		846461	1			116	83				1		9							
25	A8327	IR 77468-5-19-1	T19647		846462	1			122	92						7							
26	A8326	IR 77468-5-14-4	T19646		846463	1			124	92				1		5							
27	A8325	IR 77468-5-10-2	T19645		846464	1			119	88				1		7							
28	A8324	IR 77468-5-9-1	T19644		846465	1			117	84			S			7							
29	A8323	IR 77967-2-1-1-6-1-2	T19639		846535	1			123	92				7		9							
30	A8308	IR 77969-6-3-6-4-2	T19619		846509	1			118	86				1		9							
31	A8307	IR 77969-6-3-6-3-6	T19617		846510	1			114	84				7		9							
32	A8367	IR 71598-2-17-2-2	A7204		505209	1	15	90	110	76				7									
33	A8366	IR 70440-35-1-3	A4928		505252	1	14	107	116	84				7									
34	A8365	IR 70423-16-2-2	A4894		505264	9	15	102	110	79				7									
35	A8364	IR 70416-133-3-2	A4854		505292	7	12	99	110	78				7									
36	A8363	IR 70416-21-4-2	A4849		505289	1	11	112	104	72				7									
37	A8362	IR 70416-15-2-2	A4848		505291	1	11	116	106	73				7									
38	A8361	IR 70415-241-4-3	A4844		505295	9	12	116	110	78				7									
39	A8360	IR 70415-195-2-1	A4843		505296	7	12	109	108	76				7									
40	A8359	IR 70415-159-2-3	A4842		505297	9	14	115	110	79				7									

Description | Observation

Observational Yield Trial of Irrigated Rice Program

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Sample Workbook Files . . .

Study

	A	B	C	D	E	F	G	H
1	STUDY	IURON-1999						
2	TITLE	International Upland Rice Observational Nursery-1999						
3	PMKEY	-2						
4	OBJECTIVE	Gid						
5	START DATE	0						
6	END DATE	0						
7	STUDY TYPE	-						
8								
9	CONDITION	DESCRIPTION	PROPERTY	SCALE	METHOD	DATA TYPE	VALUE	LABEL
10								
11	FACTOR	DESCRIPTION	PROPERTY	SCALE	METHOD	DATA TYPE		LABEL
12	MONTH		MONTH	Month	Not Specified	N		MONTH
13	TRIAL							
14	ICIS_							
15	LOC							
16	COU							
17	YEAR							
18	NURS							
19								
20								
21								
22								
23	SUNS							
24	MINT							
25	MAXT							
26	RAIN							
27	RAIN							

Study

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	MONTH	TRIALNO	ICIS_LOCID	LOCCODE	COUNCODE	YEAR	NURSCODE	SUNSHINE	MINTEMP	MAXTEMP	RAINFALL	RAINDAYS		ROWTAG	
2	6	1	10712	004	EGY	1999	032		15	30					
3	6	1	10091	042	CHN	1999	032				407				
4	6	1	10070	020	CHN	1999	032	3	19	24	35	6			
5	5	1	10712	004	EGY	1999	032		19	32					
6	5	1	10091	042	CHN	1999	032				438				
7	5	1	10070	020	CHN	1999	032	5	25	31	27	7			
8	4	1	10712	004	EGY	1999	032		22	31					
9	4	1	10091	042	CHN	1999	032				327				
10	4	1	10070	020	CHN	1999	032	4	27	32	267	10			
11	3	1	10712	004	EGY	1999	032		20	30					
12	3	1	10091	042	CHN	1999	032				108				
13	3	1	10070	020	CHN	1999	032	4	26	31	103	7			
14	2	1	10712	004	EGY	1999	032		18	31					
15	2	1	10091	042	CHN	1999	032				176				
16	2	1	10070	020	CHN	1999	032	2	23	27	689	11			
17	1	1	10712	004	EGY	1999	032		15	28					
18	1	1	10091	042	CHN	1999	032				72				
19	1	1	10070	020	CHN	1999	032	3	21	28	125	11			
20															
21															
22															
23															

Description | Observation

INGER Weather Data

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Sample Workbook Files . . .

	A	B	C	D	E	F	G	H
1	STUDY	PBGB_SUB1_BC1F1						
2	TITLE	From genes to farmers' fields: enhancing and stabilizing productivity of rice in submergence prone environments						
3	PMKEY	0						
4	OBJECTIVE							
5	START DATE							
6	END DATE							
7	STUDY TYPE							
8								
9	CONDITION							
10	INSTITUTE							
11	INVESTIGATOR1							
12	INVESTIGATOR2							
13	INVESTIGATOR3							
14	SUPERVISOR1							
15	SUPERVISOR2							
16	DNA_METHOD							
17								
18	FACTOR							
19	PRIMER_ID							
20	PRIMER							
21	DESIGNATION							
22	GID							
23	ALLELE_NO							
24								
25	CONSTANT							
26								
27	VARIATE							
28	ALLELE_ID							
29	ALLELE							
30	ALLELE NAME							
31	ALLELE_ID							
32	ALLELE							
33	ALLELE NAME							

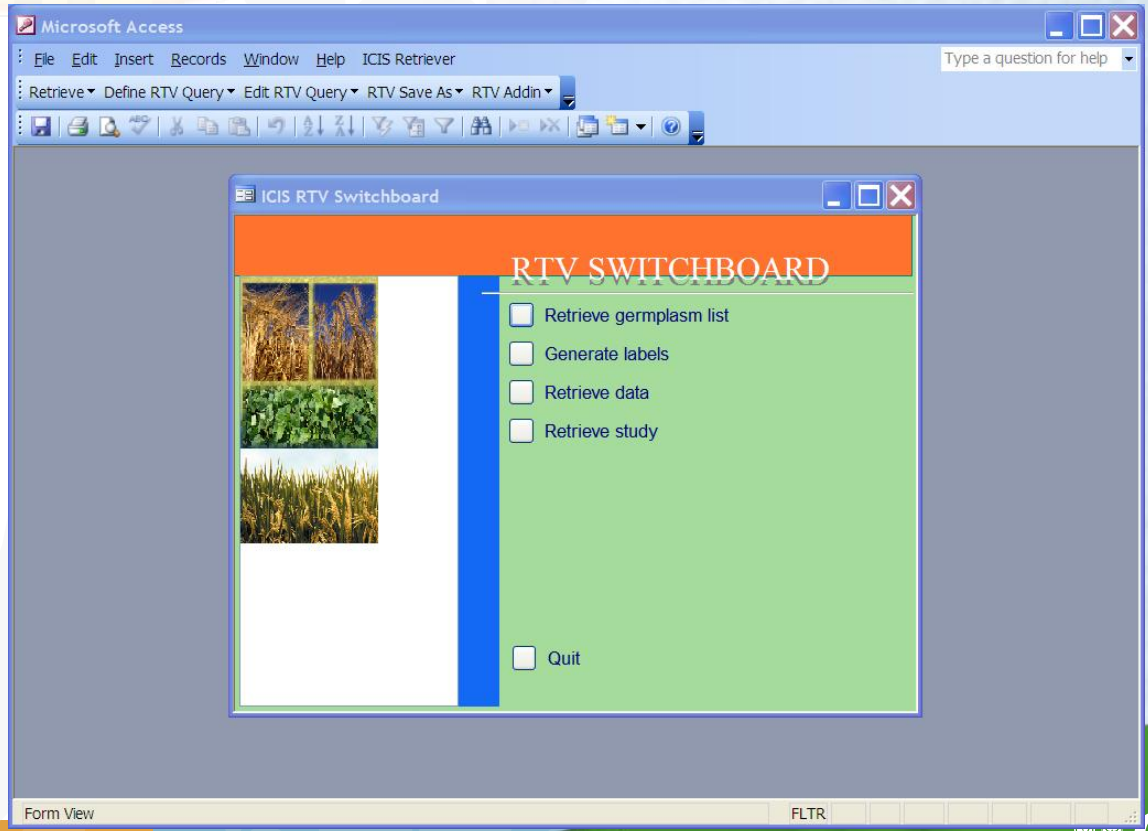
	A	B	C	D	E	F	G	H	I	J	K	L
1	PRIMER_ID	PRIMER	DESIGNATION	GID	ALLELE_ID	ALLELE	ALLELE NAME	ALLELE_ID	ALLELE	ALLELE NAME		Row Tag
2					ALLELE2	ALLELE2		ALLELE1	ALLELE1			ALLELE_NO
3	59	RM490	IR 81213:47	2452183				1257	107	A		
4	59	RM490	IR 81213:74	2452184				1257	107	A		
5	59	RM490	IR 81213:126	2452185	1408	93	B	1257	107	A		
6	59	RM490	IR 81213:140	2452186				1257	107	A		
7	59	RM490	IR 81213:129	2452187	1408	93	B	1257	107	A		
8	59	RM490	IR 81213:141	2452188				1257	107	A		
9	59	RM490	IR 81213:142	2452189				1257	107	A		
10	59	RM490	IR 81213:152	2452190				1257	107	A		
11	59	RM490	IR 81213:170	2452191				1257	107	A		
12	59	RM490	IR 81213:175	2452192	1408	93	B	1257	107	A		
13	59	RM490	IR 81213:216	2452193				1257	107	A		
14	59	RM490	IR 81213:220	2452194	1408	93	B	1257	107	A		
15	59	RM490	IR 81213:242	2452195				1257	107	A		
16	59	RM490	IR 81213:244	2452196	1408	93	B	1257	107	A		
17	59	RM490	IR 81213:261	2452197	1408	93	B	1257	107	A		
18	59	RM490	IR 81213:289	2452198	1408	93	B	1257	107	A		
19	59	RM490	IR 81213:337	2452199				1257	107	A		
20	59	RM490	IR 81213:382	2452200				1257	107	A		
21	59	RM490	IR 81213:394	2452201	1408	93	B	1257	107	A		
22	59	RM490	IR 81213:395	2452202	1408	93	B	1257	107	A		
23	59	RM490	IR 81213:396	2452203	1408	93	B	1257	107	A		
24	59	RM490	IR 81213:398	2452204				1257	107	A		
25	59	RM490	IR 81213:420	2452205				1257	107	A		
26	59	RM490	IR 81213:438	2452206				1257	107	A		
27	59	RM490	IR 81213:442	2452207	1408	93	B	1257	107	A		
28	59	RM490	IR 81213:452	2452208	1408	93	B	1257	107	A		
29	59	RM490	IR 81213:462	2452209	1408	93	B	1257	107	A		
30	59	RM490	IR 81213:474	2452210	1408	93	B	1257	107	A		
31	59	RM490	IR 81213:482	2452211				1257	107	A		
32	59	RM490	IR 81213:494	2452212	1408	93	B	1257	107	A		
33	59	RM490	IR 81213:495	2452213	1408	93	B	1257	107	A		
34	59	RM490	IR 81213:498	2452214	1408	93	B	1257	107	A		
35	59	RM490	IR 81213:505	2452215				1257	107	A		
36	59	RM490	IR 81213:634	2452216	1408	93	B	1257	107	A		
37	59	RM490	IR 81213:646	2452217				1257	107	A		
38	59	RM490	IR 81213:691	2452218				1257	107	A		
39	59	RM490	IR 81213:74	2452184				1257	107	A		
40	59	RM490	IR 81213:126	2452185	1408	93	B	1257	107	A		
41	59	RM490	IR 81213:129	2452187	1408	93	B	1257	107	A		
42	59	RM490	IR 81213:140	2452186				1257	107	A		

Description | **Observation** | markers | Data Matrix | Protocol_Sub1

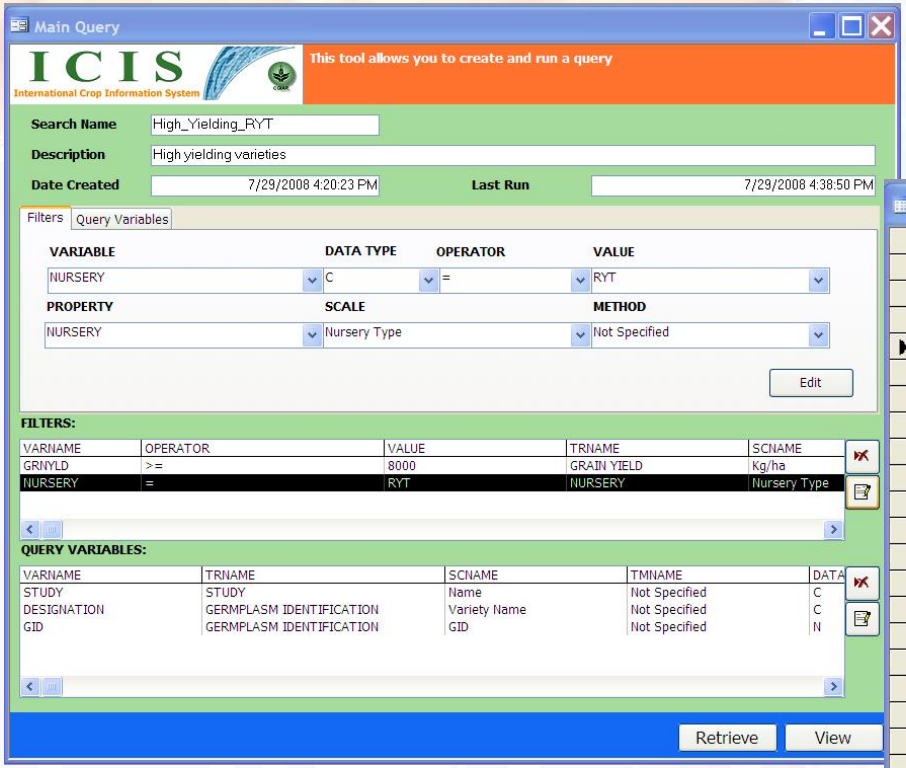
Genotyping Data

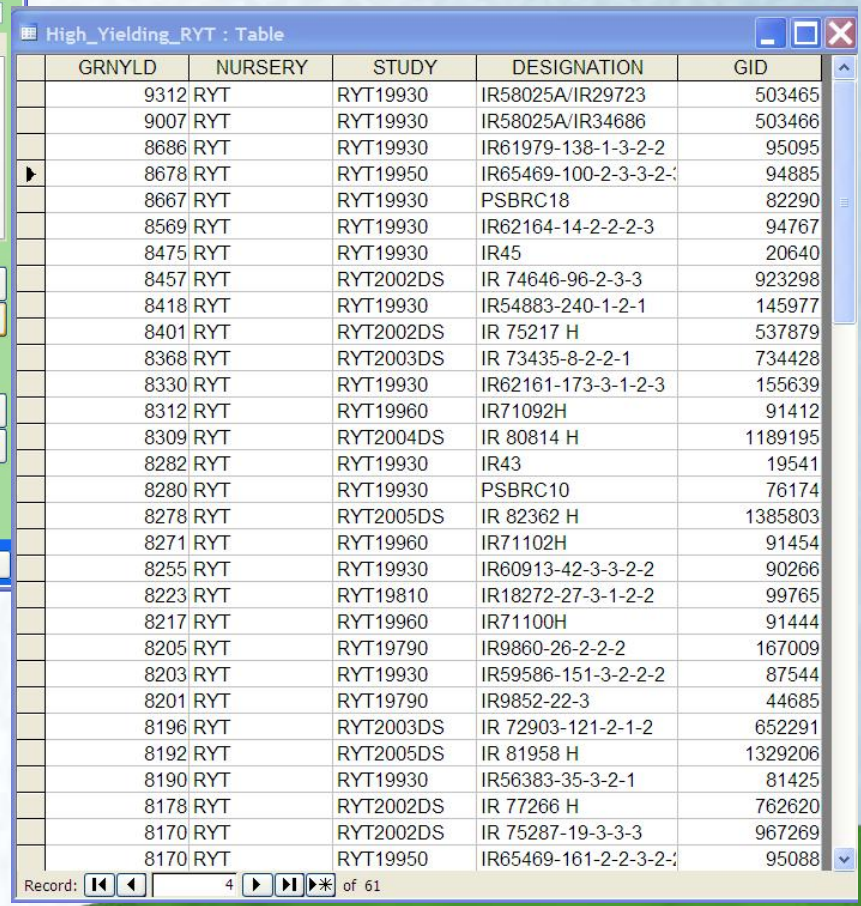
Retriever

- The ICIS Retriever is an application in MS Access that retrieves study data based on the specified property (trait), scale and method.



Sample Query





Inventory Management System (IMS)

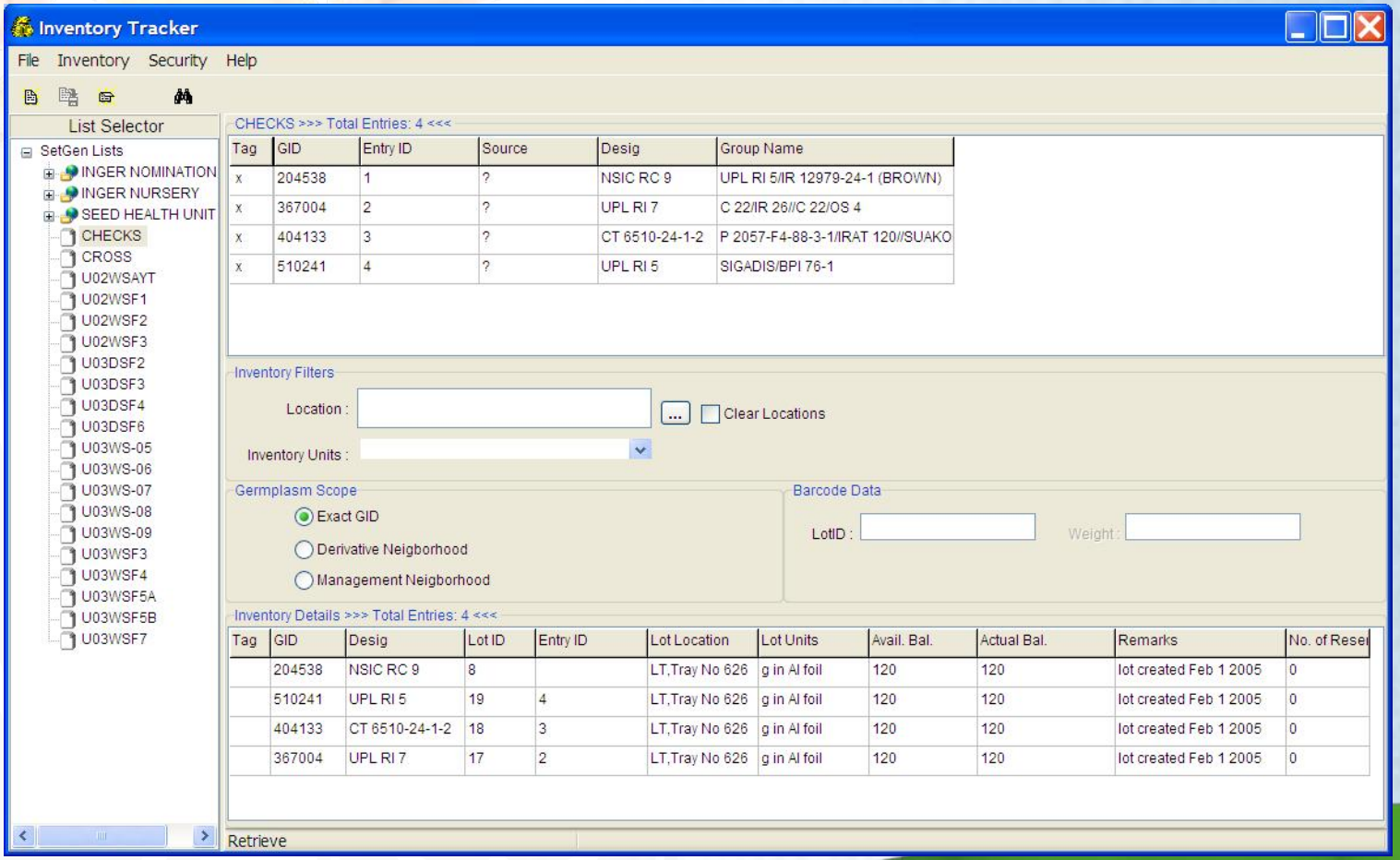
Manages inventory information for germplasm entities:

- where they are stored,
- what quantities are in storage and
- what quantities are expected,
- what quantities are reserved and
- what quantities are available for use.

A lot is defined by the combination of the sample, the storage location and unit (e.g. 100 grams of IR 64 stored in Tray Number 101, Short Term storage of Genebank)

IMS Application

- Inventory Tracker

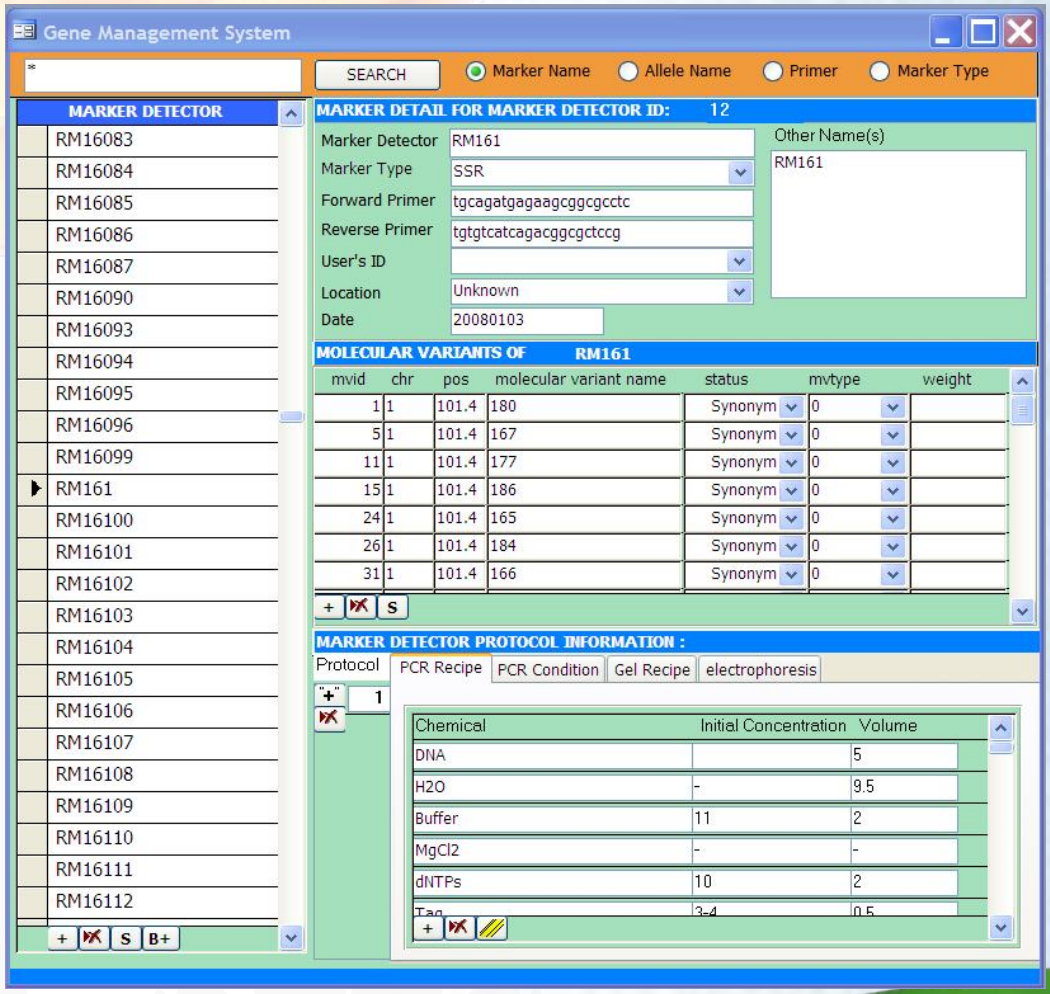


Gene Management System (GEMS)

- GEMS will manage classical genetic information and molecular characterization.
- The specific functions of GEMS are:
- .
  1. unique identification of genetic variants including molecular polymorphisms, sequences and traditional genes;
  2. management of nomenclature of molecular variants;
  3. identification of sources of different molecular variants;
  4. identification of loci and alleles including molecular and physical mapping positions;
  5. linkage of genes to traits and products

IRRI

GEMS Catalog



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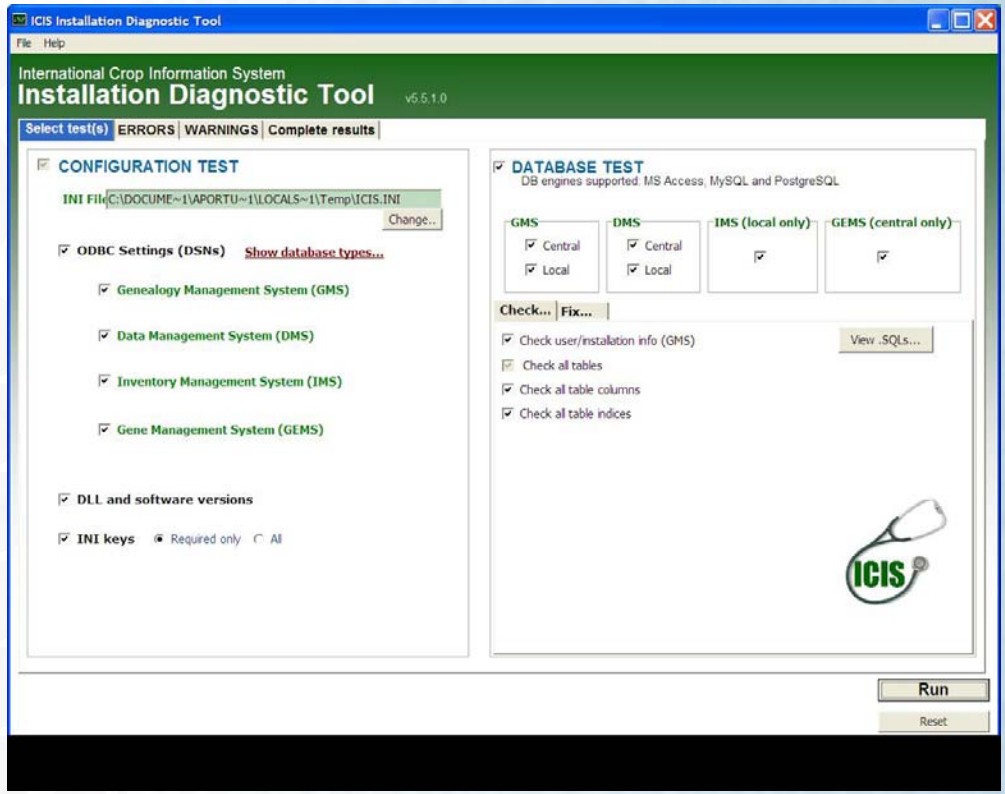
Supporting Tools

- Installation Diagnostic Tool

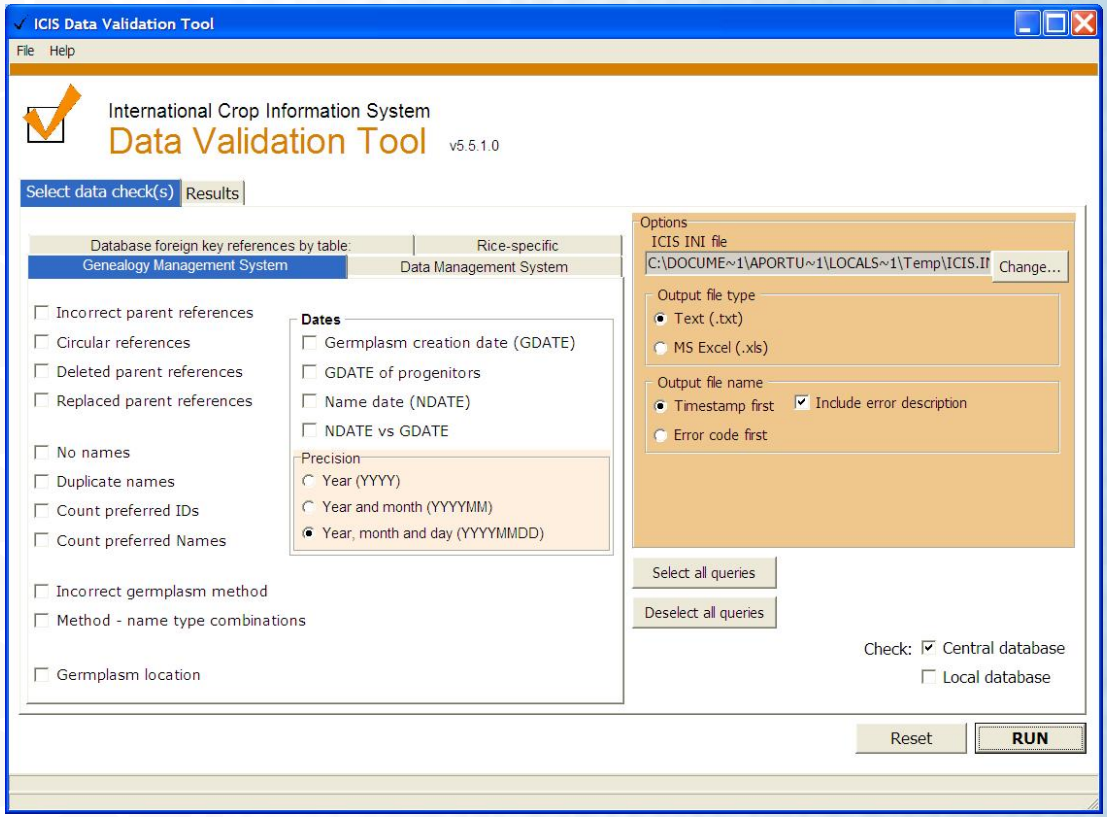
The ICIS Installation Diagnostic Tool tests the different components of your ICIS installation to determine the cause of error situations. This is useful in troubleshooting when your ICIS application is not functioning properly.



Supporting Tools ...

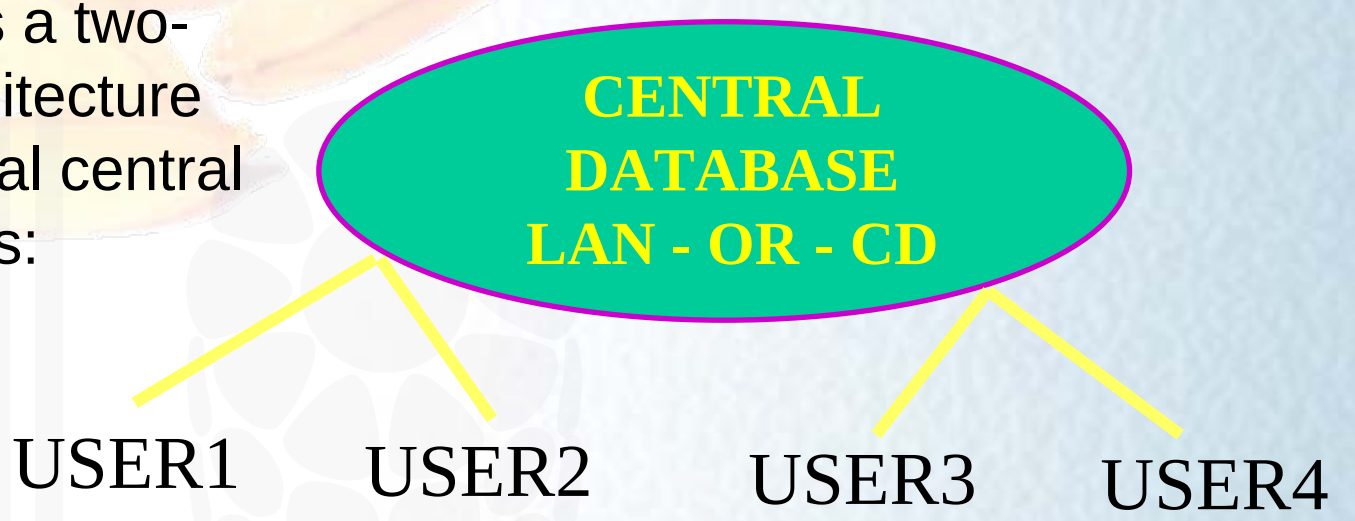
- Data Validation Tool

The ICIS Data Validation Tool is an application that searches ICIS databases for data errors that might render it meaningless. This is useful in making sure that published data are always of excellent quality.



Dispersed Data Curation and Privacy

ICIS uses a two-level architecture with a local central databases:



LOCAL DATABASE on PC

1. User is unaware that there are two databases
2. Unique identification of germplasm is retained by a combination of unique UserID+LocalGid
3. The user can retain most recent data for privacy
4. The user gets a new central database after update

IRRI

BENEFITS OF ICIS - *Within Institutes*

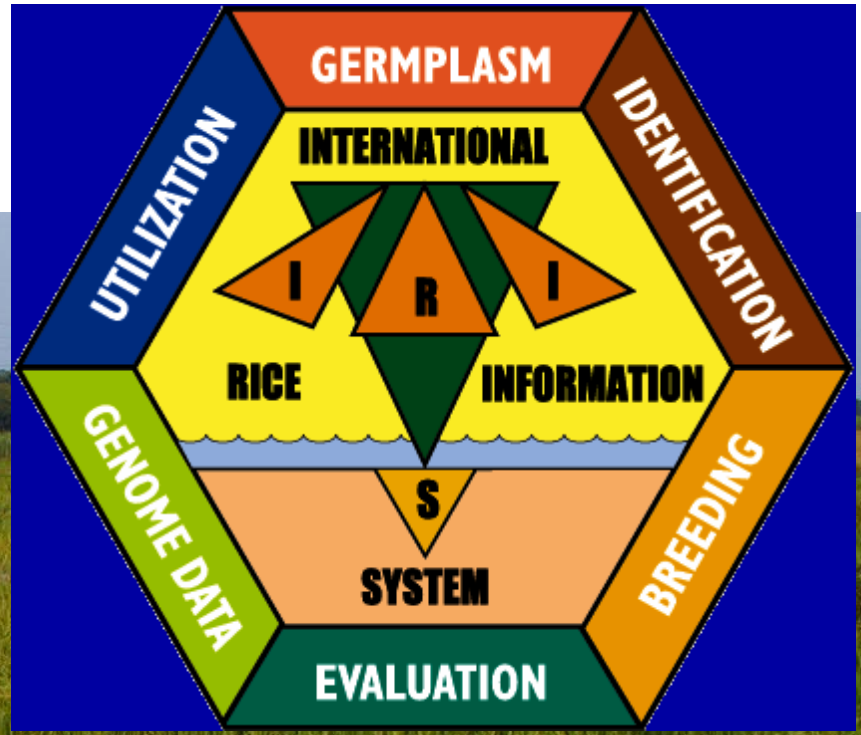
- **Unified data model for genetic resource data and germplasm characterization and utilization data**
- **Collaborative software development**
- **Institutional memory**
- **Powerful Research Tool**
  bringing information to germplasm
  - Breeders
  - Genetic Resource Specialists
  - Pathologists
  - Geneticists
  - Physiologist
  -

CIMMYT MR

The ICIS Users Team

- MARDI – Rice genetic resources
- Bayer Cropscience – Hybrid rice breeding
- University of Agricultural Sciences, Bangalore - Sorghum
- Philrice, Philippines - Rice
- CNRRI, China - Rice
- Ubon RRC, Thailand - Rice
- SARSBN (Faisabad, Chinsura, Cuttack … Rice
- ICARDA – Barley and chickpea
- Nunza – breeding for 25 vegetable crops world-wide
- Grain Biotech Australia - Wheat
- Agriculture and Agri-Food Canada - Wheat
- University of Queensland - Wheat

INTERNATIONAL RICE INFORMATION SYSTEM



What is IRIS?

- IRIS stands for the International Rice Information System which is the rice implementation of the International Crop Information System

IRIS GERMPLASM DATA SOURCES

600MB, 2.4M Germplasm Entries, 2.8M Names

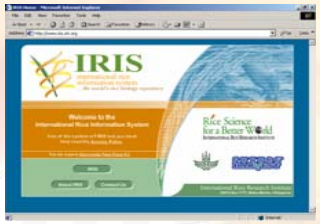
- IRGC - 120 000
- GRIN - 18 000
- IRRI Crosses 90 000
- Crosses from National Programs 100 000
- Released varieties 8 000
- Breeding lines 1 200 000
- Functional Genomics Mutants 40 000

IRIS PHENOTYPIC DATA SOURCES

800 MB, 618 Studies, 7.2M data points

- IRRI breeders evaluations
- IRGC characterization
- INGER multi location testing
- MAPPING Projects
- FG Mutant Screening

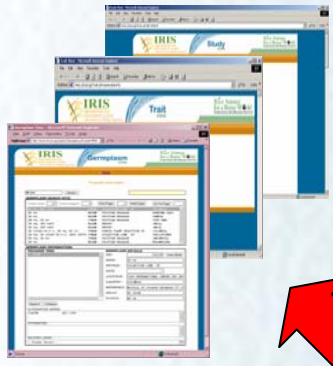
IRRI



IRIS
international rice
information system
...the world's rice biology repository

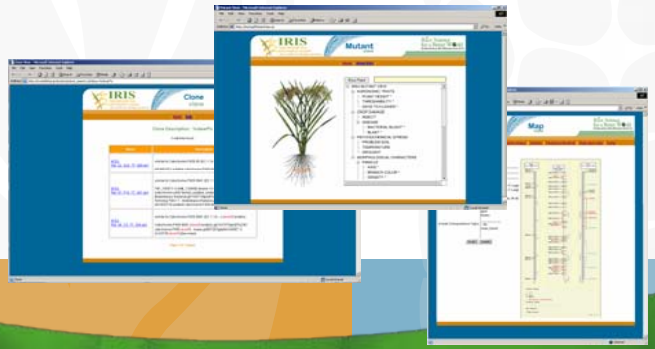
http://www.iris.irri.org

Wildcard text queries from multiple entry points, with multiple constraints



Germplasm
Genealogies,
Populations,
Genetic Resources,
Traits & Field
Evaluation Data

Genetic Maps, Genome Annotation, Mutant Stocks, EST Clones, Gene Arrays, Proteomics, Metabolomics & Molecular Variation Data



Links with
External
Databases

CIMMYT

ICIS Resources

Documentation – http://cropwiki.irri.org

Download FTP site – ftp.cgiar.org/icis

Development – http://cropforge.org