



Rhizobium Germplasm Resources at ICRISAT Center

International Crops Research Institute
for the Semi-Arid Tropics

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Abstract

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The ICRISAT *Rhizobium* culture collection represents rhizobia of the three mandate legumes: chickpea (*Cicer arietinum* L.), groundnut (*Arachis hypogaea* L.), and pigeonpea [*Cajanus cajan* (L.) Millsp.]. This catalog lists a total of 819 strains of which 259 are of chickpea, 150 of groundnut, and 410 of pigeonpea, from 17 countries. Sixty eight percent of these strains were isolated at ICRISAT Center from nodules obtained or collected from six countries. The remaining 32 % of the strains were contributions from scientists in different countries and other *Rhizobium* culture collections of the world. The collection represents rhizobia from diverse climatic regions, different soil types, different growth rates in laboratory conditions, and different effectiveness rating in glasshouse studies. Information in this catalog has been assembled to encourage use of these strains in different relevant studies by the scientific community.

Résumé

Référence : Rupela, O.P., Kumar Rao, J.V.D.K., Sudarshana, M.R., Usha Kiran, M., et Anjaiah, V. 1991. **La collection des souches de *Rhizobium* au Centre ICRISAT.** Bulletin de recherche n° 15. Patancheru, A.P. 502 324, India, International Crops Research Institute for the Semi-Arid Tropics.

La collection de l'ICRISAT est constituée des souches de *Rhizobium* de trois cultures de son programme : pois chiche (*Cicer arietinum*), arachide (*Arachis hypogaea*) et pois d'Angole [*Cajanus cajan* (L.) Millsp.]. En tout, 819 souches collectionnées dans 17 pays figurent dans ce catalogue, dont 259 du pois chiche, 150 de l'arachide, 410 du pois d'Angole. Soixante-huit pour cent de ces souches ont été isolées au Centre ICRISAT à partir des nodosités obtenues ou collectionnées de six pays. Des chercheurs de divers pays et d'autres collections de culture de *Rhizobium* ont contribué le reste des 32% des souches. La collection de l'ICRISAT représente des rhizobiums à différents taux de croissance au laboratoire et d'efficacité aux études de serre, et à différents types de sol et de régions agroclimatiques. Les données dans ce catalogue ont été réunies afin d'encourager l'utilisation de ces souches dans des recherches.

Cover: Sketches of three nodulated roots showing average nodulation under field conditions at 45-60 days after sowing: chickpea (top left), pigeonpea (bottom left), and groundnut (right).

***Rhizobium* Germplasm Resources at ICRISAT Center**

**O.P. Rupela, J.V.D.K. Kumar Rao, M.R. Sudarshana,
M. Usha Kiran, and V. Anjaiah**



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Introduction

General

Collection of rhizobia, their maintenance, multiplication, and distribution have been regarded as an important support activity for those concerned with research on biological nitrogen fixation (BNF) at ICRISAT Center. Initially, collection and maintenance of rhizobia of several legumes of interest in the semi-arid tropics were attempted. But this activity was subsequently restricted to ICRISAT's mandate legumes: chickpea (*Cicer arietinum* L.), pigeonpea [*Cajanus cajan* (L.) Millsp.], and groundnut (*Arachis hypogaea* L.). Thus we have lyophilized rhizobia of some other legume crops and these are provided on request as long as stocks last. *Rhizobium* strains of the legumes nodulated by the cowpea group rhizobia have been grouped with pigeonpea *Rhizobium* strains. We have maintained all the *Rhizobium* strains of mandate legumes that we isolated or received, irrespective of their effectiveness, in the hope that these have characteristics which may be of interest to researchers elsewhere.

Very few nodule collection trips have been undertaken by ICRISAT staff. Instead, researchers in different countries and regions were requested to send dried nodules of the legumes of interest in vials containing calcium chloride as desiccant. Rhizobia were isolated from these dried nodules, generally with about an 80% success rate. The limited information collected on these strains includes: location, soil type at collection site, growth rate and effectiveness of the strains.

Purpose of the Catalog

We have prepared this catalog to provide information on the *Rhizobium* collection at ICRISAT Center to those interested in BNF in chickpea, groundnut, and pigeonpea, who may request any strain in the collection for research purposes. The catalog thus provides users with a list by which to identify their requirements.

Structure of the Catalog

The data sheets of *Rhizobium* strains were generated directly from a database. This has been maintained on ICRISAT's VAX 11/780 computer using system 1032 software (Version V6.00-0, copyright 1986, Software House). The pattern of strain information records used by Halliday and Somasegaran (1984)¹ was adopted, with each strain record having 13 items of information. However, for preparation of this catalog we have provided the information in two sections. Section A contains complete data sheets of *Rhizobium* strains widely used. Section B lists all the *Rhizobium* strains together with details of origin, and some characteristics such as culture pH, effectiveness, growth rate, and synonyms.

About the Collection

Most of the strains are stored at 4°C in lyophilized form. The listed strains were checked for purity and nodulation

under axenic culture conditions prior to lyophilization. Most cultures have also been tested for viability and purity after lyophilization.

Nomenclature

In Bergey's Manual of Systematic Bacteriology, nodule-forming bacteria have been classified by Jordan (1984)² into two genera: *Rhizobium* and *Bradyrhizobium*. Species of the former genus are generally fast growers, and of the latter, slow growers. As per this classification, the nodule-forming bacteria of all the three legumes cataloged here are to be called *Bradyrhizobium* sp, followed immediately by the name of the host plant given in parentheses. About 13% of the strains listed in this catalog are fast growers. The strains isolated from chickpea nodules are highly specific and do not nodulate any other host. To our knowledge not many *Rhizobium* strains of these legumes have been analysed for base ratios (Mol % G+C of DNA) — an important classification criterion besides the growth rate. It is hoped that over time many of the strains may attract the attention of researchers who may then help classify this collection into *Rhizobium* and *Bradyrhizobium* strains. However, for the purpose of this catalog we opt to use the word *Rhizobium* to apply to both the *Rhizobium* and *Bradyrhizobium* strains.

1. Halliday, J., and Somasegaran, P. 1984. The *Rhizobium* germplasm resource at NifTAL, catalog of strains. 1st edn, Hawaii, USA: University of Hawaii. NifTAL Project and MIRCEN.

2. Jordan, D.C. 1984. Family III. Rhizobiaceae. In Bergey's Manual of Systematic Bacteriology, Vol I, (Krieg, N.R., ed.) pp. 235-256. Williams and Wilkins Pub. Co., Baltimore, USA.

Strain Characteristics

Most of the strains in this catalog were tested for symbiotic effectiveness in pots or in Leonard jars along with check strains; IC 2002 for chickpea, IC 3195 for pigeonpea, and IC 7001 for groundnut. The strains were rated for effectiveness based on the total dry matter produced or on total N-uptake, wherever measured. Strains that performed better than the check were designated highly effective (H). Those which performed similar to the check were named effective (E). Those performing less than the check were considered moderately effective (M). Ineffective (I) strains were those which resulted in plant growth similar to the noninoculated control.

Purified cultures were grown on yeast-extract mannitol agar at 28°C, and the time taken for appearance of isolated colonies of 2-mm diameter was recorded. The strains growing well in 2-3 days were classified as fast and the rest of them as slow. It was apparent that most of the strains in our collection were slow growers, in particular all the strains of chickpea. Culture pH was observed by growing the strains on yeast-extract mannitol agar containing bromothymol blue, and observed for change in color of the dye. Strains causing a change in color from green to yellow are classified as 'acidic', those resulting in a blue color as 'alkaline', and the rest as 'neutral'.

Details about the nodule collection site were satisfactorily recorded, particularly for those nodules collected at ICRISAT Center. The pH and EC (dS m^{-1}) of almost all fields at ICRISAT Center ranged from 8.1 to 8.2 and 0.1 to 0.2 in Vertisols and from 5.9 to 6.1 and 0.1 to 0.2 in Alfisols. Exceptions have been indicated appropriately. All available details on nodules or *Rhizobium* strains have been listed in relevant columns.

Supply of Rhizobium Strains

Rhizobium strains mentioned in this catalog are supplied on request. Requests should be addressed to the Head, Division of Crop Physiology, Legumes Program, ICRI-SAT, Patancheru, Andhra Pradesh 502 324, India. Cultures are generally despatched within 2 weeks after receipt of a request.

Request for Information

It is proposed to update the database periodically. Hence we request all concerned to submit to ICRISAT Center additional information on any of the listed strains. We also solicit further submissions of *Rhizobium* strains for chickpea, pigeonpea, or groundnut.

Country Codes

Argentina	ARG	Australia	AUS
Bangladesh	BGD	Bolivia	BOL
Brazil	BRA	Colombia	COL
India	IND	Iran	IRN
Israel	ISR	Jordan	JOR
Kenya	KEN	Malawi	MWI
Panama	PAN	Paraguay	PRY
South Africa	ZAF	Syria	SYR
Trinidad & Tobago	TTO	Turkey	TUR
United Kingdom	GBR	USA	USA
USSR	SUN	Venezuela	VEN
Zimbabwe	ZWE		

Acronyms

AICPIP	- All India Co-ordinated Pulses Improvement Project, Kanpur, Uttar Pradesh, India.
AICRIP	- All India Co-ordinated Rice Improvement Project, APAU, Rajendranagar, Andhra Pradesh, India.
AP	- Andhra Pradesh.
ARO	- Agricultural Research Organisation, Volcani Center, Betdegon, Israel.
ARS-B	- Agricultural Research Station, Badnapur, Maharashtra, India.
AU	- Annamalai University, Annamalai, Tamilnadu, India.
BHU	- Banaras Hindu University, Varanasi, U.P., India.
CIAT	- Centro Internacional de Agricultura Tropical, Cali, Colombia.
CSAUAI	- Chandra Shekar Azad University of Agriculture & Technology, Kanpur, U.P., India.
CSIRO	- Commonwealth Scientific and Industrial Research Organisation, Canberra, Australia.
GR	- Gujarat.
HAU	- Haryana Agricultural University, Hisar, Haryana, India.
IARI	- Indian Agricultural Research Institute, New Delhi, India.
IAgron	- Instituto Agronomica, Brazil.
ICAR	- Indian Council of Agricultural Research, New Delhi, India.
ICAR-RC	- Research Complex of the Indian Council of Agricultural Research, Goa, India.
ICARDA	- International Center for Agricultural Research in the Dry Areas, Aleppo, Syria.
ICRISAT	- International Crops Research Institute for the Semi-Arid Tropics, Patancheru, Andhra Pradesh, India.
ISPN	- Institute of Soil and Plant Nutrition, Ankara, Turkey.
JII	- John Innes Institute, Norwich, U.K.
JNKVV	- Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, India.
KK	- Karnataka.
MP	- Madhya Pradesh.
MS	- Maharashtra.
N	- Not known.
NAPBA	- North American Plant Breeders' Association, USA.
NCSU	- North Carolina State University, Raleigh, North Carolina, USA.
NifTAL	- Nitrogen Fixation in Tropical Agricultural Legumes Center, Maui, Hawaii, USA.
NitCo	- Nitragin Company, Milwaukee, Wisconsin, USA.
PPRI	- Plant Protection Research Institute, Pretoria, South Africa.
RES	- Rothamsted Experiment Station, Harpenden, Herts, UK.
RJ	- Rajasthan.
SU	- Sukhadia University, Jaipur, Rajasthan, India.
TN	- Tamil Nadu.
TNAU	- Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.
UAS	- University of Agricultural Sciences, Bangalore, Karnataka, India.
UP	- Uttar Pradesh.
UPan	- University of Panama, Panama.
USDA	- United States Department of Agriculture, Beltsville, Maryland, USA.
UWI	- University of West Indies, St Augustine, Trinidad, West Indies.

Section A:

Detailed information on selected *Rhizobium* strains of chickpea, pigeonpea, and groundnut

1 to 2107 *Rhizobium* strains for chickpea
3001 to 4062 *Rhizobium* strains for pigeonpea
6001 to 7114 *Rhizobium* strains for groundnut

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 53

Collector	:	ICRISAT	Collected from	:	ICRISAT Center
Site details	:	B 10, Vertisol, saline	Received in	:	1977
Form received	:	nodule			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	neutral
Effectiveness	:	effective	Last purity check	:	1986

Synonyms:

Comments : Serologically same as IC 2001 and IC 2002. The strain is being tested in AICPIP trials. Effective in saline soil.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 59

Collector	:	ICRISAT	Collected from	:	Haryana, IND
Site details	:	alluvial soil			
Received in	:	1977			
Form received	:	nodule			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	acidic
Effectiveness	:	highly effective	Last purity check	:	1986

Synonyms: TAL 1109

Comments : Promising strain for chickpea. This strain is not easily agglutinated by antiserum. Effective in field tests.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 76

Collector	:	ICRISAT	Collected from	:	Haryana, IND
Site details	:	alluvial	Received in	:	1977
Form received	:	nodule			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	acidic
Effectiveness	:	highly effective	Last purity check	:	1986

Synonyms: TAL 1111

Comments : Recommended for commercial inoculation. Poor in agglutination tests.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 149

Collector	:	ICRISAT	Collected from	:	
Site details	:	alluvial	Received in	:	Haryana, IND
Form received	:	nodule		:	1977

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	highly effective	Last purity check	:	

Synonyms:

Comments:

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 2001

Collector	:	RES	Collected from	:	N
Site details	:	N	Received in	:	1976
Form received	:	freeze-dried			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	effective	Last purity check	:	1982

Synonyms : CB1189, R3827, TAL619

Comments : Serologically same as IC 53 and IC 2002. Recommended strain for chickpea inoculation in Australia.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 2002

Collector	:	RES	Collected from	:	N
Site details	:	N	Received in	:	1976
Form received	:	freeze-dried			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	effective	Last purity check	:	

Synonyms : R 3889, TAL 620, CC 1192.

Comments : Serologically related to IC 53 and IC 2001. An ineffective variant was observed. Highly competitive over TAL 480 and TAL 1148.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 2018

Collector	:	ISPN	Collected from	:	TUR
Site details	:	Mediterranean coast	Received in	:	
Form received	:	Agar slope			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	effective	Last purity check	:	1982

Synonyms: N68

Comments : Being tested in AICPIP trials.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 2099

Collector	:	IARI	Collected from	:	N
Site details	:	N	Received in	:	1980
Form received	:	Agar slope			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	highly effective	Last purity check	:	1986

Synonyms : F 75

Comments : Recommended for commercial inoculation. Received approval after years of testing by AICPIP for the inoculation of chickpea in India.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 3035

Collector	:	ICRISAT	Collected from	:	ICRISAT Center
Site details	:	BW 6, Vertisol	Received in	:	1976
Form received	:	nodule			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	alkaline
Effectiveness	:	effective	Last purity check	:	1983

Synonyms: IHP 35

Comments : Forms black nodules.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 3069

Collector	:	ICRISAT	Collected from	:	ICRISAT Center
Site details	:	B 10, Vertisol	Received in	:	1976
Form received	:	nodule			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	alkaline
Effectiveness	:	effective	Last purity check	:	1982

Synonyms: IHP 69

Comments : Isolated from Indigofera glandulosa

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 3100

Collector	:	ICRISAT	Collected from	:	ICRISAT Center
Site details	:	RA 25, Alfisol, saline	Received in	:	1976
Form received	:	nodule			

CHARACTERISTICS OF THE CULTURE

Growth	:	fast	Culture pH	:	acidic
Effectiveness	:	effective	Last purity check	:	1982

Synonyms : IHP 100

Comments :

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 3195

Collector	:	ICRISAT	Collected from	:	ICRISAT Center
Site details	:	RW IC, Alfisol	Received in	:	1977
Form received	:	soil sample			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	alkaline
Effectiveness	:	effective	Last purity check	:	1982

Synonyms : IHP 195

Comments : Recommended for commercial inoculation. Serologically related to IC 4060. With age, forms colonies with red center on medium containing congo red. Trapped on siratro from soil.

RHIZOBIUM GERMLASM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 3324

Collector	:	ICRISAT	Collected from	:	ICRISAT Center
Site details	:	G 5	Received in	:	1979
Form received	:	soil sample			

CHARACTERISTICS OF THE CULTURE

Growth	:	fast	Culture pH	:	acidic
Effectiveness	:	effective	Last purity check	:	1982

Synonyms : IHP 324

Comments : Causes leaf-roll on pigeonpea.

RHIZOBIUM GERMLASM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 3342

Collector	:	ICRISAT	Collected from	:	ICRISAT Center
Site details	:	B 9, Vertisol	Received in	:	1979
Form received	:	soil sample			

CHARACTERISTICS OF THE CULTURE

Growth	:	fast	Culture pH	:	N
Effectiveness	:	effective	Last purity check	:	1983

Synonyms : IHP 342

Comments : Causes leaf-roll on pigeonpea. Trapped on siratro from nonrhizosphere soil.

RHIZOBIUM GERMLASM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 4059

Collector	:	TNAU	Collected from	:	N
Site details	:	N	Received in	:	1980
Form received	:	Agar slope			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	effective	Last purity check	:	1983

Synonyms : IHP 511, CC-1

Comments : Being tested in AICPIP trials.

RHIZOBIUM GERMLASM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 4060

Collector	:	IAR1	Collected from	:	IARI Campus
Site details	:	N	Received in	:	1980
Form received	:	Agar slope			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	effective	Last purity check	:	1983

Synonyms : IHP 512, F 4

Comments : Recommended for commercial inoculation. Serologically related to IC 3195.

RHIZOBIUM GERMPLASM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 4061

Collector	:	CSAUAT	Collected from	:	N
Site details	:	N	Received in	:	1980
Form received	:	Agar slope			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	effective	Last purity check	:	1983

Synonyms : IHP 513, KA 1

Comments : Being tested in AICPIP trials.

RHIZOBIUM GERMPLASM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 4062

Collector	:	ARS	Collected from	:	N
Site details	:	N	Received in	:	1980
Form received	:	Agar slope			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	effective	Last purity check	:	1983

Synonyms : IHP 514. BDN A2

Comments : Being tested in AICPIP trials.

RHIZOBIUM GERMPLASM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 6006

Collector	:	ICRISAT	Collected from	:	ICRISAT Center
Site details	:	N	Received in	:	1980
Form received	:	nodule			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	N
Effectiveness	:	highly effective	Last purity check	:	1983

Synonyms :

Comments:

RHIZOBIUM GERMPLASM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 7001

Collector	:	NCSU	Collected from	:	BOL
Site details	:	dark alluvial loam	Received in	:	1977
Form received	:	porcelain bead			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	neutral
Effectiveness	:	effective	Last purity check	:	1983

Synonyms : NC 92

Comments : Recommended as commercial inoculant. Produces siderophores in culture medium.

RHIZOBIUM GERmplasm RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 7017

Collector	:	ARO	Collected from	:	Volcani Center, ISR
Site details	:	N	Received in	:	1977
Form received	:	Agar slope			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	neutral
Effectiveness	:	highly effective	Last purity check	:	1983

Synonyms: 5a/70

Comments : Promising strain for groundnut. Being tested in AICORPO trials. Produces siderophores in culture medium.

RHIZOBIUM GERmplasm RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 7029

Collector	:	IAgron	Collected from :	BRA
Site details	:	N	Received in :	1979
Form received	:	Agar slope		

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	neutral
Effectiveness	:	effective	Last purity check	:	1982

Synonyms : SMS 176

Comments :

RHIZOBIUM GERmplasm RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 7034

Collector	:	NifTAL	Collected from	:	Virginia. USA
Site details	:	N	Received in	:	1978
Form received	:	Agar slope			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	neutral
Effectiveness	:	effective	Last purity check	:	1982

Synonyms : TAL 176, Nit 8A14

Comments : Poor competitor with native rhizobia.

RHIZOBIUM GERmplasm RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 7058

Collector	:	NCSU	Collected from	:	N
Site details	:	N	Received in	:	1977
Form received	:	porcelain bead			

CHARACTERISTICS OF THE CULTURE

Growth	:	slow	Culture pH	:	neutral
Effectiveness	:	highly effective	Last purity check	:	1982

Synonyms: NC 43.3

Comments : Fast nodulating strain. High N₂-fixing strain in the greenhouse Highly competitive with IC 7001, IC 7034, and native rhizobia.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 7113

Collector : NAPBA
Site details : N
Form received : porcelain bead

Collected from : N
Received in : 1985

CHARACTERISTICS OF THE CULTURE

Growth : slow
Effectiveness : highly effective

Culture pH : neutral
Last purity check : 1987

Synonyms : RP182-13

Comments : Competitive with native rhizobia.

RHIZOBIUM GERMPLOSM RESOURCE - LEGUMES PROGRAM

Rhizobium strain IC 7114

Collector : NifTAL
Site details : Haplustoll
Form received : porcelain bead

Collected from : Hamakuapoko, NifTAL site, HI, USA
Received in : 1978

CHARACTERISTICS OF THE CULTURE

Growth : slow
Effectiveness : effective

Culture pH : alkaline
Last purity check : 1987

Synonyms : TAL 1000

Comments: Sensitive to 4°C storage in peat.

Section B:

List of *Rhizobium* strains of chickpea, pigeonpea, and groundnut maintained at ICRISAT Center (IC)

1 to 164 Chickpea rhizobia isolated at ICRISAT Center
2001 to 2107 Chickpea rhizobia from other sources
3001 to 3586 Pigeonpea rhizobia isolated at ICRISAT Center
4001 to 4062 Pigeonpea rhizobia from other sources
6001 to 6140 Groundnut rhizobia isolated at ICRISAT Center
7001 to 7114 Groundnut rhizobia from other sources

Explanation of the numbered columns:

Column 1. Rhizobium strain number (IC no.)

Column 2. Donor institute/organization

Column 3. Origin of the strain

Column 4. Site details

Column 5. Effectiveness: H = Highly effective
E = Effective
M = Moderately effective
I = Ineffective

Column 6. Growth: S = Slow
F = Fast

Column 7. pH of the culture: Ac = Acidic
Al = Alkaline
Ne = Neutral

Column 8. Synonyms

Column 9. Comments

N = Not known

1	2	3	4	5	6	7	8	9
1	ICRISAT	ICRISAT Center	B 8, Vertisol	E	s	Ne		
2	ICRISAT	ICRISAT Center	M 5, Vertisol	N	s	Ac		
3	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
4	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	N		
5	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	N		
6	ICRISAT	ICRISAT Center	M 4, Vertisol	I	s	Ne	TAL 1103	Useful as an ineffective control
7	ICRISAT	ICRISAT Centre	M 4, Vertisol	E	s	Ac		
8	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ne		
9	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
10	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	N		
11	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
12	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
13	ICRISAT	ICRISAT Center	M 4, Vertisol	M	s	Ne	TAL 1104	
14	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	Ne		
15	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
16	ICRISAT	ICRISAT Center	M 5, Vertisol	I	s	Ac	TAL 1105	
17	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	N		
18	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
19	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	Ac		
20	ICRISAT	ICRISAT Center	B 10, Vertisol, saline	M	s	Ac		
21	ICRISAT	ICRISAT Center	B 10, Vertisol, saline	E	s	Ne		
22	ICRISAT	ICRISAT Center	B 10, Vertisol, saline	E	s	Ac		
23	ICRISAT	ICRISAT Center	ST 1, Vertisol, saline	M	s	Ac		
24	ICRISAT	ICRISAT Center	B 10, Vertisol, saline	M	s	Ne		
25	ICRISAT	ICRISAT Center	B 10, Vertisol, saline	N	s	Ne		
26	ICRISAT	ICRISAT Center	B 10, Vertisol, saline	M	s	Ac		Reported effective in ICARDA trials
27	ICRISAT	ICRISAT Center	M 4, Vertisol	M	s	N		
28	ICRISAT	ICRISAT Center	M 5, Vertisol	N	s	Ne		
29	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
30	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
31	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
32	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	Ac		
33	ICRISAT	ICRISAT Center	M 4, Vertisol	H	s	Ac		
35	ICRISAT	ICRISAT Center	M 4, Vertisol	M	s	Ac	TAL 1106	
36	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	Ac		
37	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	Ne		
38	ICRISAT	ICRISAT Center	M 4, Vertisol	I	s	Ne	TAL 1107	
39	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	Ac		
40	ICRISAT	ICRISAT Center	M 4, Vertisol	M	s	N		
41	ICRISAT	ICRISAT Center	M 5, Vertisol	E	s	N		
42	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	Ne		
43	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	N		
44	ICRISAT	ICRISAT Center	M 4, Vertisol	H	s	Ac		
46	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	Ac		
47	ICRISAT	ICRISAT Center	M 4, Vertisol	M	s	N		
48	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	Ac		
50	ICRISAT	ICRISAT Center	M 4, Vertisol	M	s	Ne		
51	ICRISAT	ICRISAT Center	BW 1, Vertisol	M	s	N		
52	ICRISAT	ICRISAT Center	B 10, Vertisol, saline	M	s	Ne		

1	2	3	4	5	6	7	8	9
53	ICRISAT	ICRISAT Center	B 10, Vertisol, saline	E	S	Ne		Serologically same as 2001 and 2002
54	ICRISAT	ICRISAT Center	ST 1, Vertisol	M	S	Ac		
55	ICRISAT	ICRISAT Center	ST 1, Vertisol	I	S	Ac		
56	ICRISAT	ICRISAT Center	B 10, Vertisol, saline	I	S	Ac		
57	ICRISAT	Haryana, IND	Sandy soil	I	S	Ne		
58	ICRISAT	Haryana, IND	Entisol	I	S	Ac		
59	ICRISAT	Haryana, IND	Alluvial soil	H	S	Ac	TAL 1109	Promising strain for chickpea
60	ICRISAT	Haryana, IND	Alluvial soil	N	S	Ac		
61	ICRISAT	Haryana, IND	Alluvial	I	S	Ac		
62	ICRISAT	Haryana, IND	Sandy soil	I	S	N	TAL 1110	
63	ICRISAT	Haryana, IND	Alluvial	H	S	Ne		
64	ICRISAT	Haryana, IND	Alluvial	E	S	Ac		
65	ICRISAT	Hisar, Haryana, IND	Alluvial	I	S	Ac		
66	ICRISAT	Hisar, Haryana, IND	Alluvial	E	S	Ac		
67	ICRISAT	Hisar, Haryana, IND	Alluvial	E	S	Ne		
68	ICRISAT	Hisar, Haryana, IND	Alluvial	M	S	N		
69	ICRISAT	Hisar, Haryana, IND	Alluvial	M	S	Ac		
70	ICRISAT	Hisar, Haryana, IND	Alluvial	E	S	Ac	TAL 1113	
71	ICRISAT	Hisar, Haryana, IND	Alluvial	E	S	Ac	TAL 1114	
72	ICRISAT	Hisar, Haryana, IND	Alluvial	M	S	Ac		
73	ICRISAT	Haryana, IND	Alluvial	E	S	Ac	TAL 1116	
74	ICRISAT	Haryana, IND	Alluvial	E	S	Ac		
75	ICRISAT	Haryana, IND	Alluvial	E	S	Ac		
76	ICRISAT	Haryana, IND	Alluvial	H	S	Ac	TAL 1111	Recommended for commercial inoculation
77	ICRISAT	Haryana, IND	Alluvial	E	S	Ne		
78	ICRISAT	Haryana, IND	Alluvial	E	S	Ac		
79	ICRISAT	Haryana, IND	Alluvial	E	S	Ne		
80	ICRISAT	Haryana, IND	Alluvial	M	S	Ne		
81	ICRISAT	Haryana, IND	Alluvial	M	S	N		
82	ICRISAT	Haryana, IND	Alluvial	E	S	N		
83	ICRISAT	Haryana, IND	Alluvial	E	S	N		
84	ICRISAT	Haryana, IND	Alluvial	E	S	Ac		
85	ICRISAT	Haryana, IND	Alluvial	M	S	Ne		
86	ICRISAT	Haryana, IND	Alluvial	E	S	Ne		
87	ICRISAT	Haryana, IND	Alluvial	M	S	Ne		
88	ICRISAT	Haryana, IND	Alluvial	M	S	Ne		
89	ICRISAT	Haryana, IND	Alluvial	E	S	Ne	TAL 1117	
90	ICRISAT	Haryana, IND	Alluvial	M	S	Ne	TAL 1118	
91	ICRISAT	Haryana, IND	Alluvial	E	S	N	TAL 1119	
93	ICRISAT	Haryana, IND	Alluvial	E	S	Ac		
94	ICRISAT	Haryana, IND	Alluvial	H	S	Ac		Being tested in AICPIP trials
96	ICRISAT	Haryana, IND	Alluvial	M	S	N		
97	ICRISAT	Haryana, IND	Alluvial	M	S	N		
98	ICRISAT	Haryana, IND	Alluvial	E	S	Ne		
99	ICRISAT	ICRISAT Center	R 2, Alfisol	E	S	Ne		
101	ICRISAT	ICRISAT Center	R 2, Alfisol	E	S	N		
102	ICRISAT	ICRISAT Center	R 2, Alfisol	M	S	Ne		
103	ICRISAT	ICRISAT Center	R 2, Alfisol	M	S	Ne		
105	ICRISAT	ICRISAT Center	R 2, Alfisol	M	S	Ne		

1	2	3	4	5	6	7	8	9
106	ICRISAT	ICRISAT Center	R 2, Alfisol	E	s	Ne		
107	ICRISAT	ICRISAT Center	R 2, Alfisol	M	s	Ne		
108	ICRISAT	ICRISAT Center	R 2, Alfisol	H	s	Ne	TAL	1112
109	ICRISAT	ICRISAT Center	R 2, Alfisol	E	s	Ne		
110	ICRISAT	ICRISAT Center	R 2, Alfisol	E	s	Ac		
111	ICRISAT	ICRISAT Center	R 2, Alfisol	E	s	Ac		
112	ICRISAT	ICRISAT Center	R 2, Alfisol	M	s	N		
113	ICRISAT	ICRISAT Center	R 2, Alfisol	E	s	N		
114	ICRISAT	ICRISAT Center	R 2, Alfisol	E	s	Ac		
115	ICRISAT	ICRISAT Center	R 2, Alfisol	M	s	Ne		
116	ICRISAT	ICRISAT Center	R 2, Alfisol	E	s	N		
117	ICRISAT	ICRISAT Center	R 2, Alfisol	E	s	N		
118	ICRISAT	ICRISAT Center	R 2, Alfisol	H	s	N		
119	ICRISAT	ICRISAT Center	R 2, Alfisol	H	s	N		
120	ICARDA	Himayatpur, BGD	Alluvial	N	s	N		
121	ICARDA	Himayatpur, BGD	Alluvial	I	s	N		Effective in ICARDA tests
122	ICARDA	Himayaipur, BGD	Alluvial	M	s	N		
123	ICARDA	Himayatpur, BGD	Submerged alluvial	I	s	N		
124	ICARDA	Himayatpur, BGD	Submerged alluvial	E	s	N		
125	ICARDA	Himayatpur, BGD	Submerged alluvial	M	s	N		
126	ICARDA	Himayatpur, BGD	Submerged alluvial	N	s	N		
127	ICARDA	Himayatpur, BGD	Submerged alluvial	I	s	N		
128	ICRISAT	Rajasthan, IND	Sandy soil	M	s	N	DNRaI, TAL	621
129	ICRISAT	Pantnagar, UP, IND	Loam	M	s	N		
130	ICRISAT	Pantnagar, UP, IND	Loam	I	s	N		
131	ICRISAT	Warangal, AP, IND	Vertisol	I	s	Ne		
132	ICRISAT	Warangal, AP, IND	Vertisol	I	s	Ac		
133	ICRISAT	ICRISAT Center	M 5, Vertisol	I	s	N		
134	ICRISAT	ICRISAT Center	M 5, Vertisol	E	s	N		
135	ICRISAT	Beseewa, MP, IND	N	E	s	N		
136	ICRISAT	IRN	N	N	s	N		
137	ICRISAT	IRN	N	N	s	N		
138	ICRISAT	ICRISAT Center	M 5, Vertisol	N	s	N		
139	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	N		
140	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	N		
141	ICRISAT	ICRISAT Center	M 4, Vertisol	E	s	N		
142	ICRISAT	ICRISAT Center	M 4, Vertisol	N	s	N		
143	ICRISAT	ICRISAT Center	B 10, Vertisol, saline		s	N		
144	ICRISAT	ICRISAT Center	B 10, Vertisol, saline		s	N		
145	ICRISAT	ICRISAT Center	B 10, Vertisol, saline		s	N		
146	ICRISAT	ICRISAT Center	B 10, Vertisol, saline		s	N		
147	ICRISAT	ICRISAT Center	B 10, Vertisol, saline		s	N		
148	ICRISAT	Haryana, IND	Alluvial	M	s	N		
149	ICRISAT	Haryana, IND	Alluvial	H	s	N		
150	ICRISAT	ICRISAT Center	R 2, Alfisol	E	s	N		
151	ICRISAT	Annigeri, KK, IND	Vertisol	E	s	N		
152	ICRISAT	IRN	N	E	s	N		
153	ICRISAT	Haryana, IND	N	E	s	N		
154	ICRISAT	ICRISAT Center	N	N	s	N	Cicer-2	
155	ICRISAT	ICRISAT Center	N	N	s	Ac		
156	ICRISAT	ICRISAT Center	N	N	s	N	Cicer-1	

1	2	3	4	5	6	7	8	9
157	ICRISAT	ICRISAT Center	N	N	s	N		
158	ICRISAT	Rahuri, MS, IND	Vertisol	I	s	N		
159	ICRISAT	Annigeri, KK, IND	Vertisol	M	s	N		
160	ICRISAT	Annigeri, KK, IND	Vertisol	H	s	N		
161	ICRISAT	ISR	Hilly area	I	s	N		Isolated from wild Cicer sp.
162	ICRISAT	ISR	Hilly area	I	s	N		Isolated from wild Cicer sp.
163	ICRISAT	ISR	Hilly area	I	s	N		Isolated from wild Cicer sp.
164	ICRISAT	N	N	N	s	N		
2001	RES	N	N	E	s	N	CB 1189, R 3827, TAL 619	Serologically same as IC 53 & IC 2002
2002	RES	N	N	E	s	N	CC 1192, R 3889,	Serologically same as IC 53 & IC 2001
2003	RES	N	N	N	s	N	R 3829	
2004	RES	N	N	N	s	Ne	R 3832	
2005	RES	N	N	N	s	Ac	R 3833-1	
2006	RES	N	N	N	s	N	R 3833-2	
2007	RES	N	N	N	s	N	R 3828	
2008	RES	N	N	E	s	N	R 3844	Being tested in AICPIP trials
2009	RES	N	N	N	s	N	R 3846-1	
2010	RES	N	N	N	s	N	R 3846-2	
2011	RES	N	N	N	s	N	R 3887	
2012	ISPN	Central Anatolia, TUR	N	H	s	N	N18	
2013	ISPN	Central Anatolia, TUR	N	E	s	N	N29	
2014	ISPN	TUR	Mediterranean coast	E	s	N	N45	
2015	ISPN	TUR	Mediterranean coast	E	s	N	N48	
2016	ISPN	TUR	Mediterranean coast	M	s	N	N59	
2017	ISPN	TUR	Mediterranean coast	H	s	N	N62	
2018	ISPN	TUR	Mediterranean coast	E	s	N	N68	Being tested in AICPIP trials
2019	ISPN	TUR	Mediterranean coast	E	s	N	N78	
2020	ISPN	TUR	Mediterranean coast	E	s	N	N80	
2021	ISPN	SUN	N	M	s	N	522	
2022	ISPN	Central Anatolia	N	E	s	N	N40	
2023	HAU	Fatehbad, Haryana, IND	Sandy loam	I	s	N	CH 810	
2024	HAU	Fatehbad, Haryana, IND	Sandy loam	E	s	N	CH 816	
2025	HAU	Fatehbad, Haryana, IND	Sandy loam	E	s	N	CH 817	
2026	HAU	Hisar, Haryana, IND	Sandy loam	E	s	N	CH 828	
2027	HAU	Hisar, Haryana, IND	Sandy loam	I	s	N	CH 827	
2028	HAU	Hansi, Haryana, IND	Sandy loam	E	s	N	CH 777	Being tested in AICPIP trials
2029	HAU	Hansi, Haryana, IND	Sandy loam	I	s	N	CH 776	
2030	HAU	Hisar, Haryana, IND	Sandy loam	E	s	N	CH 769	
2031	HAU	Hansi, Haryana, IND	Sandy loam	I	s	N	CH 706	
2032	HAU	Hisar, Haryana, IND	Sandy loam	N	s	N	CH 832	
2033	HAU	Hisar, Haryana, IND	Sandy loam	I	s	N	CH 831	
2034	HAU	Hisar, Haryana, IND	Sandy loam	I	s	N	CH 829	
2035	HAU	Hisar, Haryana, IND	Sandy loam	I	s	N	CH 723	
2036	HAU	Tohana, Haryana, IND	Sandy loam	I	s	N	CH 728	
2037	HAU	Tohana, Haryana, IND	Sandy loam	I	s	N	CH 732	
2038	HAU	Hisar, Haryana, IND	Sandy loam	I	s	N	CH 735	

1	2	3	4	5	6	7	8	9
2039	HAU	Hisar, Haryana, IND	Sandy loam	I	S	N	CH741	
2040	HAU	Tohana, Haryana, IND	Sandy loam	I	S	N	CH 754	
2041	HAU	Tohana, Haryana, IND	Sandy loam	I	S	N	CH 756	
2042	HAU	Tohana, Haryana, IND	Sandy loam	I	S	N	CH 757	
2043	HAU	Tohana, Haryana, IND	Sandy loam		S	N	CH 764	
2044	HAU	Tohana, Haryana, IND	Sandy loam	I	S	N	CH 806	
2045	HAU	HAU Farm, Hisar, IND	Sandy loam	E	S	N	CH 837	
2046	HAU	New Delhi, IND	IARI Farm, Sandy loam	E	S	N	Ca-2	
2047	HAU	New Delhi, IND	IARI Farm, Sandy loam	E	S	N	Ca-3	
2048	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-7, TAL 623	
2049	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	E	S	N	Ca-18	
2050	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	E	S	N	Ca-46	
2051	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	E	S	N	Ca-75	
2052	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-81	
2053	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-121	
2054	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-121 Str50	Str 50 resistant mutant of IC
2055	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-141	
2056	HAU	Str mutant of IC 2055		N	S	N	Ca-141 Str50	Str 50 resistant mutant of Ca-141
2057	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-164	
2058	HAU	Hisar, Haryana. IND	HAU Farm, Sandy loam	E	S	N	Ca 181.IC 166	Being tested in AICPIP trials
2059	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-1001	
2060	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-1002	
2061	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-1003	
2062	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-102	
2063	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-111	
2064	HAU	Hisar, Haryana, IND	HAU Farm, Sandy loam	N	S	N	Ca-124	
2065	HAU	Hisar, Haryana, IND	Sandy loam	H	S	N	CH701	
2066	ICARDA	Charbao, Dhakha, BGD	Flood plain	N	S	N	CP-8	
2067	ICARDA	Charbao, Dhakha, BGD	Flood plain	N	S	N	CP-9	
2068	ICARDA	Charbao, Dhakha, BGD	Flood plain	N	S	N	CP-10	
2069	ICARDA	Charbao, Dhakha, BGD	Flood plain	N	S	N	CP-11	
2070	ICARDA	Charbao, Dhakha, BGD	Rood plain	N	S	N	CP-12	
2072	ICARDA	Jable, Lattakia, SYR	Sandy saline soil	H	S	Ac	CP-1a	Was tested in AICPIP field trials
2073	ICARDA	ICARDA Center	N	N	S	N	CP-2b	
2074	ICARDA	ICARDA Center	N	E	S	N	CP-3a	
2075	ICARDA	ICARDA Center	N	E	S	Ac	CP-4a	
2076	ICARDA	ICARDA Center	N	M	S	N	CP-5b	
2077	ICARDA	ICARDA Center	N	H	S	N	CP-7a	
2078	ICARDA	ICARDA Center	Red soil	M	S	Ac	CP-13a	
2079	ICARDA	Ariha, Idlib, SYR	Red soil	E	S	N	CP-18b	
2080	ICARDA	Nauor, Madaba, JOR	Red soil	M	S	N	CP-20b	
2081	ICARDA	Azaz,SYR	Red soil	E	S	N	CP-14b	
2082	ICARDA	Azaz,SYR	Red soil	N	S	N	CP-14a	
2083	ICARDA	Alanka, Karak, SYR	Vertisol	E	S	N	CP-23b	
2086	HAU	Hansi, Haryana. IND	Sandy loam	I	S	N	CH 775	
2087	RES	N	N	N	N	N	R 3890	
2089	RES	N	N	N	S	N	R 3888	
2091	JII	Mutant of IC 2002	N	E	S	N	9036, CM 1	Str 200 mutant of IC 2002
2092	IARI	N	N	E	S	N	G5-81	Being tested in AICPIP trials
2093	IARI	N	N	E	S	N	G 10-80	Being tested in AICPIP trials
2094	ICRISAT	Mutant of IC 2002	Mutant of IC 2002	I	S	N		Ineffective mutant of IC 2002

1	2	3	4	5	6	7	8	9
2095	BHU	Varanasi, UP, IND	Alluvial	E	S	Ac	G 567	Being tested in AICPIP trials
2096	ICRISAT	Variant of H 45	Variant of H-45	I	S	N		Ineffective variant of H 45
2097	IARI	N	N	E	S	N	B 1	Being tested in AICPIP trials
2098	IAR1	N	N	E	s	N	F 6	Being tested in AICPIP trials
2099	IARI	N	N	H	s	N	F 75	Recommended for commercial inoculation
2100	CSAUAT	Deegh, Kanpur, UP, IND	Sandy loam, pH 7.5	E	s	Ne	KG 31	Being tested in AICPIP trials
2101	CSAUAT	Bilhaur, UP, IND	Clay loam, pH 7.2	E	s	Ac	KG 46	Being tested in AICPIP trials
2102	CSAUAT	Pura, Kanpur, UP, IND	Sandy loam, pH 8.0	E	s	Ac	KG 61	Being tested in AICPIP trials
2103	HAU	Bhiwani, RJ, IND	Sandy loam	E	s	N	CBH 32	Being tested in AICPIP trials
2104	NifTAL	Gulbarga, KK, IND	Vertisol	H	s	A1	UASB 67, TAL 480	Being tested in AICPIP trials
2105	NifTAL	N	N	E	s	Ne	Nit27A3, TAL 1148	Being tested in AICPIP trials
2106	HAU	Str 200 mutant of H 45	N	E	s	N	CH 8545	
2107	SU	N	N	E	s	N	DGW - 4	Being tested in AICPIP trials
3001	ICRISAT	ICRISAT Center	B 5, Vertisol	E	F	Ac	IHP 1	
3002	ICRISAT	ICRISAT Center	B 5, Vertisol	E	F	Ac	IHP 2	
3004	ICRISAT	ICRISAT Center	B 5, Vertisol	E	F	Ac	IHP 4	
3005	ICRISAT	ICRISAT Center	B 5, Vertisol	E	S	Ac	IHP 5	
3006	ICRISAT	ICRISAT Center	B 5, Vertisol	E	S	Ac	IHP 6	
3007	ICRISAT	ICRISAT Center	R 1, Alfisol	E	S	A1	IHP 7	
3008	ICRISAT	ICRISAT Center	R 1. Alfisol	E	S	A1	IHP 8	
3010	ICRISAT	ICRISAT Center	R 1, Alfisol	E	F	Ac	IHP 10	
3011	ICRISAT	ICRISAT Center	R 1, Alfisol	E	F	Ac	IHP 11	
3012	ICRISAT	ICRISAT Center	RA 26, Alfisol	E	S	Al	IHP12	
3013	ICRISAT	ICRISAT Center	RA 26, Alfisol	E	S	Ac	IHP 13	
3016	ICRISAT	ICRISAT Center	RA 26, Alfisol	N	F	N	IHP16	
3023	ICRISAT	ICRISAT Center	ST 1, Vertisol	E	S	A1	IHP 23	
3024	ICRISAT	ICRISAT Center	ST 1, Vertisol	E	F	A1	IHP 24	
3025	ICRISAT	ICRISAT Center	ST 1, Vertisol	E	S	Al	IHP 25	
3028	ICRISAT	ICRISAT Center	BW 7, Vertisol	E	S	Al	IHP 28	
3029	ICRISAT	ICRISAT Center	BW 7, Vertisol	E	S	Al	IHP 29	
3031	ICRISAT	ICRISAT Center	ST 1, Vertisol	E	S	Ac	IHP 31	
3032	ICRISAT	ICRISAT Center	ST 1, Vertisol	E	S	Al	IHP 32	
3033	ICRISAT	ICRISAT Center	ST 1, Vertisol	E	F	Ac	IHP 33	
3035	ICRISAT	ICRISAT Center	BW 6, Vertisol	E	S	Al	IHP 35	Forms black nodules
3036	ICRISAT	ICRISAT Center	BW 6, Vertisol	E	S	A1	IHP 36	
3037	ICRISAT	ICRISAT Center	BW 6, Vertisol	E	S	Al	IHP 37	
3038	ICRISAT	ICRISAT Center	BW 6, Vertisol	E	S	Al	IHP 38	
3039	ICRISAT	ICRISAT Center	B 4, Vertisol	E	F	Ac	IHP 39	
3040	ICRISAT	ICRISAT Center	B 4, Vertisol	E	S	Al	IHP 40	
3041	ICRISAT	ICRISAT Center	R 1, Alfisol	E	S	A1	IHP 41	
3042	ICRISAT	ICRISAT Center	R 1, Alfisol	E	S	Al	IHP 42	
3043	ICRISAT	ICRISAT Center	R 1, Alfisol	E	F	Ac	IHP 43	
3044	ICRISAT	ICRISAT Center	R 1, Alfisol	E	F	Ac	IHP 44	
3045	ICRISAT	ICRISAT Center	R 1. Alfisol	E	F	Ac	IHP 45	
3046	ICRISAT	ICRISAT Center	R 1, Alfisol	E	F	Ac	IHP 46	
3047	ICRISAT	ICRISAT Center	BW 1. Vertisol	E	S	Al	IHP 47	
3048	ICRISAT	ICRISAT Center	BW 1, Vertisol	E	F	Ac	IHP 48	
3049	ICRISAT	ICRISAT Center	BW 1, Vertisol	E	F	Ac	IHP 49	
3050	ICRISAT	ICRISAT Center	BW 1, Vertisol	E	F	Ac	IHP 50	
3053	ICRISAT	ICRISAT Center	ST 1, Vertisol	E	S	Al	IHP 53	

1	2	3	4	5	6	7	8	9
3054	ICRISAT	ICRISAT Center	ST 1, Vertisol	I	S	Ac	IHP54	
3055	ICRISAT	ICRISAT Center	B 2, Vertisol	I	S	Ac	IHP 55	
3057	ICRISAT	ICRISAT Center	B 2, Vertisol	N	F	Ac	IHP 57	
3058	ICRISAT	ICRISAT Center	B 2, Vertisol	E	S	Ac	IHP 58	
3060	ICRISAT	ICRISAT Center	RA 26, Alfisol	E	S	A1	IHP 60	
3063	ICRISAT	ICRISAT Center	R 10, Alfisol	E	F	Ac	IHP 63	
3064	ICRISAT	ICRISAT Center	R 10, Alfisol	E	F	Ac	IHP 64	
3065	ICRISAT	ICRISAT Center	R 10, Alfisol	E	F	Ac	IHP 65	
3066	ICRISAT	ICRISAT Center	B 10, Vertisol	E	S	A1	IHP 66	Isolated from Indigofera glandulosa
3067	ICRISAT	ICRISAT Center	B 10, Vertisol	E	S	AI	IHP 67	Isolated from Indigofera glandulosa
3068	ICRISAT	ICRISAT Center	B 10. Vertisol	E	S	AI	IHP 68	Isolated from Indigofera glandulosa
3069	ICRISAT	ICRISAT Center	B 10, Vertisol	E	S	AI	IHP 69	Isolated from Indigofera glandulosa
3070	ICRISAT	ICRISAT Center	B 10, Vertisol	E	F	Ac	IHP 70	Isolated from Sesbania
3071	ICRISAT	ICRISAT Center	B 10, Vertisol	E	S	Ac	IHP 71	Isolated from Sesbania
3073	ICRISAT	ICRISAT Center	B 10, Vertisol	E	F	Ac	IHP 73	Isolated from Sesbania
3074	ICRISAT	ICRISAT Center	BA 10, Vertisol	E	F	Ac	IHP 74	Isolated from Sesbania
3075	ICRISAT	ICRISAT Center	BA 10, Vertisol	E	F	Ac	IHP 75	
3076	ICRISAT	ICRISAT Center	BA 10. Vertisol	E	F	Ac	IHP 76	
3077	ICRISAT	ICRISAT Center	B 10. Vertisol	E	F	Ac	IHP 77	Isolated from Phaseolus tulobus
3078	ICRISAT	ICRISAT Center	B 10. Vertisol	E	S	Ac	IHP 78	Isolated from 'Phaseolous tulobus'
3079	ICRISAT	ICRISAT Center	B 10, Vertisol	E	F	N	IHP 79	Isolated from 'Phaseolous tulobus'
3083	ICRISAT	ICRISAT Center	B 10, Vertisol	E	S	Ac	IHP 83	
3086	ICRISAT	ICRISAT Center	B 10, Vertisol	E	F	Ac	IHP 86	
3087	ICRISAT	ICRISAT Center	B 10, Vertisol	E	S	AI	IHP 87	
3088	ICRISAT	ICRISAT Center	B 10, Vertisol	E	F	Ac	IHP 88	
3094	ICRISAT	ICRISAT Center	RA 17, Alfisol	E	F	N	IHP 94	
3096	ICRISAT	ICRISAT Center	RA 17, Alfisol	N	N	Ac	IHP 96	
3097	ICRISAT	ICRISAT Center	RA 17, Alisol	N	F	N	IHP 97	
3099	ICRISAT	ICRISAT Center	RA 17. Alfisol	N	F	Ac	IHP 99	
3100	ICRISAT	ICRISAT Center	RA 25, Alfisol, Saline	E	F	Ac	IHP 100	
3101	ICRISAT	ICRISAT Center	RA 25, Alfisol, Saline	N	F	N	IHP 101	
3102	ICRISAT	ICRISAT Center	RA 25, Alfisol, Saline	N	N	N	IHP 102	
3103	ICRISAT	ICRISAT Center	RA 25. Alfisol, Saline	N	N	N	IHP 103	
3105	ICRISAT	ICRISAT Center	M 14, Vertisol	N	F	Ac	IHP 105	
3107	ICRISAT	ICRISAT Center	BA 25, Vertisol	N	F	Ac	IHP 107	
3108	ICRISAT	ICRISAT Center	BA 25, Vertisol	N	F	Ac	IHP 108	
3109	ICRISAT	ICRISAT Center	BA 25, Vertisol	N	S	AI	IHP 109	
3110"	ICRISAT	Pune, MS, IND	Vertisol	N	S	AI	IHP 110	
3111	ICRISAT	Pune, MS, IND	Vertisol	I	S	AI	IHP 111	
3112	ICRISAT	Pune, MS, IND	Vertisol	I	S	AI	IHP 112	
3113	ICRISAT	Pune, MS, IND	Vertisol	N	S	AI	IHP 113	
3114	ICRISAT	Pune, MS, IND	Vertisol	N	S	AI	IHP 114	Isolated from groundnut
3115	ICRISAT	Pune. MS, IND	Vertisol	N	S	AI	IHP 115	Isolated from groundnut
3116	ICRISAT	Pune, MS, IND	Vertisol	N	S	AI	IHP 116	Isolated from groundnut
3117	ICRISAT	Pune, MS, IND	Vertisol	N	S	AI	IHP 117	Isolated from groundnut

1	2	3	4	5	6	7	8	9
3118	ICRISAT	Pune, MS, IND	Sandy Vertisol	N	S	Al	IHP 118	Isolated from groundnut
3119	ICRISAT	Pune, MS, IND	Vertisol	N	S	Al	IHP 119	Isolated from groundnut
3120	ICRISAT	Pune, MS, IND	Vertisol	N	S	Al	IHP 120	Isolated from groundnut
3121	ICRISAT	Pune, MS, IND	Vertisol	N	S	Al	IHP 121	Isolated from groundnut
3122	ICRISAT	Pune, MS, IND	Vertisol	N	S	Al	IHP 122	Isolated from groundnut
3123	ICRISAT	Pune, MS, IND	Vertisol	N	S	Al	IHP 123	Isolated from groundnut
3124	ICRISAT	Pune, MS, IND	Brown soil	N	S	N	IHP 124	
3126	ICRISAT	Pune, MS, IND	N	N	S	Al	IHP 126	
3127	ICRISAT	Pune, MS, IND	N	N	S	Al	IHP 127	
3128	ICRISAT	ICRISAT Center	Paddy field	N	F	Ac	IHP 128	From Aeschynomene indica root nodule
3130	ICRISAT	ICRISAT Center	Paddy field	N	S	Al	IHP 130	From Aeschynomene indica stem nodule
3131	ICRISAT	ICRISAT Center	Paddy field	N	S	Ac	IHP 131	From Aeschynomene indica stem nodule
3134	ICRISAT	ICRISAT Center	Paddy field	N	S	Al	IHP 134	From Aeschynomene indica stem nodule
3135	ICRISAT	Dokur, AP, IND	N	N	F	Ac	IHP 135	
3136	ICRISAT	Dokur, AP, IND	N	N	S	Al	IHP 136	
3137	ICRISAT	Dokur, AP, IND	N	N	S	Al	IHP 137	
3138	ICRISAT	Dokur, AP, IND	N	N	S	Al	IHP 138	
3142	ICRISAT	Dokur, AP, IND	N	N	S	Al	IHP 142	
3144	ICRISAT	Aurupalle, AP, IND	N	N	S	Al	IHP 144	
3145	ICRISAT	Aurupalle, AP, IND	N	N	F	Ac	IHP 145	
3146	ICRISAT	Aurupalle, AP, IND	N	N	F	Al	IHP 146	
3147	ICRISAT	Aurupalle, AP, IND	N	E	S	Al	IHP 147	
3149	ICRISAT	Aurupalle, AP, IND	N	E	S	Al	IHP 149	
3150	ICRISAT	Aurupalle, AP, IND	N	N	S	Al	IHP 150	
3151	ICRISAT	Aurupalle, AP, IND	N	N	S	Al	IHP 151	
3152	ICRISAT	Aurupalle, AP, IND	N	N	S	Al	IHP 152	
3153	ICRISAT	Aurupalle, AP, IND	N	N	S	Al	IHP 153	
3154	ICRISAT	Aurupalle, AP, IND	N	N	F	Al	IHP 154	
3155	ICRISAT	Jadcherla, AP, IND	N	E	F	N	IHP 155	
3156	ICRISAT	Jadcherla, AP, IND	N	N	N	Al	IHP 156	
3157	ICRISAT	Jadcherla, AP, IND	N	N	F	Ac	IHP 157	
3159	ICRISAT	Jadcherla, AP, IND	N	N	S	Al	IHP 159	
3161	ICRISAT	Jadcherla, AP, IND	N	N	S	Al	IHP 161	
3162	ICRISAT	Jadcherla, AP, IND	N	N	S	Al	IHP 162	
3163	ICRISAT	ICRISAT Center	RW 2, Alfisol	N	S	Al	IHP 163	Isolated from black nodule of cowpea
3164	ICRISAT	ICRISAT Center	RW 2, Alfisol	N	S	Al	IHP 164	Isolated from black nodule of cowpea
3165	ICRISAT	ICRISAT Center	RW 2, Alfisol	N	F	Ac	IHP 165	Isolated from black nodule of cowpea
3166	ICRISAT	ICRISAT Center	RW 2, Alfisol	N	S	Ac	IHP 166	Isolated from black nodule of cowpea
3167	ICRISAT	ICRISAT Center	BW 4, Vertisol	N	S	Al	IHP 167	Trapped on siratro from soil

1	2	3	4	5	6	7	8	9
3169	ICRISAT	ICRISAT Center	BW 4, Vertisol	N	S	Ac	IHP 169	Trapped on siratro from soil
3171	ICRISAT	ICRISAT Center	BW 4, Vertisol	N	F	Ac	IHP 171	Trapped on siratro
3172	ICRISAT	ICRISAT Center	BW 4, Vertisol	N	S	N	IHP 172	Trapped on siratro
3174	ICRISAT	ICRISAT Center	BW 4, Vertisol	N	S	N	IHP 174	Trapped on siratro from soil
3176	ICRISAT	ICRISAT Center	BW 4, Vertisol	N	S	Al	IHP 176	Trapped on siratro from soil
3177	ICRISAT	ICRISAT Center	BW 4, Vertisol	N	S	N	IHP 177	Trapped on siratro
3178	ICRISAT	ICRISAT Center	BW 4, Vertisol	N	S	N	IHP 178	Trapped on siratro from soil
3179	ICRISAT	ICRISAT Center	BW 3, Vertisol	N	S	Al	IHP 179	Trapped on siratro from soil at 30 cm
3180	ICRISAT	ICRISAT Center	BW 3, Vertisol	N	S	Al	IHP 180	Trapped on siratro from soil at 30 cm
3182	ICRISAT	ICRISAT Center	BW 3, Vertisol	N	S	Al	IHP 182	Trapped on siratro from soil
3183	ICRISAT	ICRISAT Center	BW 3, Vertisol	N	S	Al	IHP 183	Trapped on siratro from soil at 30 cm
3184	ICRISAT	ICRISAT Center	BW 3, Vertisol	N	S	Al	IHP 185-1	Trapped on siratro from soil
3185	ICRISAT	ICRISAT Center	BW 3, Vertisol	N	S	Ac	IHP 185-2	Trapped on siratro from soil
3190	ICRISAT	ICRISAT Center	RW 1C, Alfisol	N	S	N	IHP 190	Trapped on siratro from soil
3193	ICRISAT	ICRISAT Center	RW 1C, Alfisol	N	S	Al	IHP 193	Trapped on siratro from soil
3195	ICRISAT	ICRISAT Center	RW 1C, Alfisol	E	S	Al	IHP 195	Recommended for commercial inoculation
3196	ICRISAT	ICRISAT Center	RW 1C, Alfisol	N	S	Al	IHP 196	Trapped on siratro from soil at 30 cm
3197	ICRISAT	ICRISAT Center	RW 1C, Alfisol	N	S	Al	IHP 197	Trapped on siratro from soil at 30 cm
3200	ICRISAT	ICRISAT Center	RW 1C, Alfisol	N	F	N	IHP 200	Trapped on siratro from soil
3201	ICRISAT	ICRISAT Center	RW 2B, Alfisol	N	S	Al	IHP 201	Trapped on siratro from soil at 30 cm
3202	ICRISAT	ICRISAT Center	RW 2B, Alfisol	N	S	Al	IHP 202	Trapped on siratro from soil
3204	ICRISAT	ICRISAT Center	RW 2B, Alfisol	N	S	Al	IHP 204	Trapped on siratro from soil
3205	ICRISAT	ICRISAT Center	RW 2B, Alfisol	N	S	Ac	IHP 205-1	Trapped on siratro from soil
3206	ICRISAT	ICRISAT Center	RW 2B, Alfisol	N	S	Al	IHP 206	Trapped on siratro from soil
3207	ICRISAT	ICRISAT Center	RW 2B, Alfisol	N	S	Al	IHP 207	Trapped on siratro from soil
3211	ICRISAT	ICRISAT Center	RA 27, Alfisol	N	F	N	IHP 211	Trapped on siratro from soil
3212	ICRISAT	ICRISAT Center	RA 27, Alfisol	N	S	N	IHP 212	Trapped on siratro from soil
3213	ICRISAT	ICRISAT Center	RA 27, Alfisol	N	S	Al	IHP 213	Trapped on siratro from soil
3218	ICRISAT	ICRISAT Center	RA 2, Alfisol	N	S	Ac	IHP 218	Trapped on siratro from soil
3219	ICRISAT	ICRISAT Center	RA 2, Alfisol	N	S	N	IHP 219	Trapped on siratro from soil
3220	ICRISAT	ICRISAT Center	RA 2, Alfisol	N	S	Al	IHP 220	Trapped on siratro from soil
3221	ICRISAT	ICRISAT Center	RA 2, Alfisol	N	S	Al	IHP 221	Trapped on siratro from soil
3222	ICRISAT	ICRISAT Center	RA 2, Alfisol	N	S	Al	IHP 222	Trapped on siratro from soil
3223	ICRISAT	Hisar, Haryana, IND	Entisol	N	F	Ac	IHP 223	
3225	ICRISAT	Hisar, Haryana, IND	Entisol	N	S	Al	IHP 225	
3226	ICRISAT	Hisar, Haryana, IND	Entisol	N	S	Al	IHP 226	
3228	ICRISAT	Hisar, Haryana, IND	Entisol	N	F	N	IHP 228	
3229	ICRISAT	Tapariwara, J & K, IND	N	N	S	Al	IHP 229	Trapped on siratro from soil
3234	ICRISAT	Rajendranagar, AP, IND	AICRIP Farm	N	F	Ac	IHP 234	Isolated from Lucerne
3235	ICRISAT	Rajendranagar, AP, IND	AICRIP Farm	N	S	Al	IHP 235	Isolated from moong
3238	ICRISAT	Masing, Machakos, KEN	N	N	S	Ac	IHP 238	
3239	ICRISAT	Masing, Machakos, KEN	N	N	S	Ac	IHP 239	

1	2	3	4	5	6	7	8	9
3244	ICRISAT	N	N	N	S	N	IHP 244	Isolated from weed legumes
3245	ICRISAT	N	N	N	S	N	IHP 245	Isolated from weed legumes
3250	ICRISAT	ICRISAT Center	N	N	F	Ac	IHP 250	
3260	ICRISAT	ICRISAT Center	M 5, Vertisol	N	F	Ac	IHP 260	Trapped on siratro from soil
3261	ICRISAT	ICRISAT Center	M 5, Vertisol	N	N	Ac	IHP 261	Trapped on siratro from soil
3266	ICRISAT	Nandihills, KK, IND	Hilly, altitude 1200 M	E	S	Al	IHP 266	From rhizosphere of <i>Atylosia albicans</i>
3267	ICRISAT	Nandihills, KK, IND	Hilly, altitude 1200 M	E	S	Al	IHP 267	From rhizosphere of <i>Atylosia albicans</i>
3269	ICRISAT	Nandihills, KK, IND	Hilly, altitude 1200 M	E	S	Al	IHP 269	From rhizosphere of <i>Atylosia albicans</i>
3271	ICRISAT	Thekkadi, Kerala, IND	Altitude 840 M	E	S	N	IHP 271	From rhizosphere of <i>Atylosia goensis</i>
3272	ICRISAT	Thekkadi, Kerala, IND	Altitude 880 M	E	S	Al	IHP 272	From rhizosphere of <i>Atylosia goensis</i>
3273	ICRISAT	Thekkadi, Kerala, IND	Altitude 880 M	E	S	Al	IHP 273	From rhizosphere of <i>Atylosia goensis</i>
3274	ICRISAT	Thekkadi, Kerala, IND	Altitude 880 M	E	S	Al	IHP 274	From rhizosphere of <i>Atylosia goensis</i>
3276	ICRISAT	Ootacamund, TN, IND	Hilly, altitude 1940 M	E	S	N	IHP 276	
3277	ICRISAT	Ootacamund, TN, IND	Hilly, altitude 1940 M	E	F	Ac	IHP 277	
3278	ICRISAT	Ootacamund, TN, IND	Hilly, altitude 1940 M	I	S	N	IHP 278	From rhizosphere of <i>Atylosia rugosa</i>
3280	ICRISAT	Ootacamund, TN, IND	Hilly, altitude 1940 M	I	F	N	IHP 280	From rhizosphere of <i>Atylosia rugosa</i>
3282	ICRISAT	Ootacamund, TN, IND	Hilly, altitude 1940 M	E	S	Al	IHP 282	From rhizosphere of <i>Atylosia rugosa</i>
3283	ICRISAT	Ootacamund, TN, IND	Hilly, altitude 1940 M	I	F	Ac	IHP 283	From rhizosphere of <i>Atylosia rugosa</i>
3284	ICRISAT	Ootacamund, TN, IND	Hilly, altitude 1940 M	E	F	Al	IHP 284	From rhizosphere of <i>Atylosia rugosa</i>
3286	ICRISAT	Ootacamund, TN, IND	Hilly, altitude 1940 M	E	F	Ac	IHP 286	From rhizosphere of <i>Atylosia trinervia</i>
3287	ICRISAT	Ootacamund, TN, IND	Hilly, altitude 1940 M	I	F	N	IHP 287	From rhizosphere of <i>Atylosia trinervia</i>
3291	ICRISAT	Hyderabad, AP, IND	Hilly area	E	S	Ac	IHP 291	Isolated from <i>Alysicarpus</i> sp
3292	ICRISAT	Hyderabad, AP, IND	Hilly area	I	S	Al	IHP 292	Isolated from <i>Indigofera</i> sp
3293	ICRISAT	Hyderabad, AP, IND	Hilly area	I	S	Al	IHP 293	Isolated from <i>Desmodium diffusum</i>
3294	ICRISAT	Hyderabad, AP, IND	Hilly area	I	S	Al	IHP 294	Isolated from <i>Desmodium dichotomum</i>
3295	ICRISAT	Hyderabad, AP, IND	RW 1C Alfisol	E	S	Al	IHP 295	Trapped on siratro from soil
3299	ICRISAT	ICRISAT Center	RW 2B, Alfisol	E	F	Al	IHP 299	Trapped on siratro from soil
3301	ICRISAT	ICRISAT Center	RW 2B, Alfisol	E	S	Al	IHP 301	Trapped on siratro from soil
3304	ICRISAT	Hyderabad, AP, IND	APAU Farm, Hyderabad	E	F	N	IHP 304	Isolated from soybean
3305	ICRISAT	Hyderabad, AP, IND	APAU Farm, Hyderabad	E	F	Al	IHP 305	Isolated from soybean
3307	ICRISAT	Hyderabad, AP, IND	APAU Farm, Hyderabad	E	F	N	IHP 307	Isolated from soybean
3309	ICRISAT	ICRISAT Center	Glass house	E	S	Al	IHP 309	From uninoculated but nodulated plant

1	2	3	4	5	6	7	8	9
3310	ICAR-RC	N	N	I	F	Ac	IHP 310	
3311	ICAR-RC	N	N	E	F	Ac	IHP 311	
3314	ICAR-RC	N	N	I	F	Ac	IHP 314	
3315	ICAR-RC	N	N	I	F	Ac	IHP 315	
3320	ICRISAT	ICRISAT Center	RA 33, Alfisol	N	S	Al	IHP 320	Trapped on siratro from soil
3322	ICRISAT	ICRISAT Center	RA 26, Alfisol	E	S	Ac	IHP 322	
3323	ICRISAT	ICRISAT Center	RA 26, Alfisol	E	S	Al	IHP 323	Trapped on siratro from soil
3324	ICRISAT	ICRISAT Center	G5	E	F	Ac	IHP 324	Causes leaf-roll on pigeonpea
3325	ICRISAT	ICRISAT Center	G5	E	S	Ac	IHP 325	
3326	ICRISAT	ICRISAT Center	B 9, Vertisol	E	S	Al	IHP 326	Trapped on siratro
3327	ICRISAT	ICRISAT Center	B 9, Vertisol	I	N	Ac	IHP 327	Trapped on siratro from soil
3328	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	N	IHP 328	From rhizosphere of pigeonpea
3329	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	N	IHP 329	From rhizosphere of pigeonpea
3330	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	Ac	IHP 330	Trapped on siratro from soil
3331	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	N	IHP 331	Trapped on siratro from soil
3332	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	Ac	IHP 332	Trapped on siratro from soil
3334	ICRISAT	ICRISAT Center	B 9, Vertisol	I	S	Ac	IHP 334	Trapped on siratro from soil
3336	ICRISAT	ICRISAT Center	B 9, Vertisol	I	S	Ac	IHP 336	Trapped on siratro from soil
3337	ICRISAT	ICRISAT Center	B 9, Vertisol	E	S	Ac	IHP 337	Trapped on siratro from soil
3338	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	Ac	IHP 338	Trapped on siratro from nonrhizosphere
3339	ICRISAT	ICRISAT Center	B 9, Vertisol	I	F	Ac	IHP 339	Trapped on siratro from nonrhizosphere
3340	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	Ac	IHP 340	Trapped on siratro from nonrhizosphere
3342	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	N	IHP 342	Causes leaf-roll on pigeonpea
3344	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	Ac	IHP 344	Trapped on siratro from nonrhizosphere
3345	ICRISAT	ICRISAT Center	B 9, Vertisol	I	F	Ac	IHP 345	Trapped on siratro from nonrhizosphere
3346	ICRISAT	ICRISAT Center	B 9, Vertisol	I	F	N	IHP 346	Trapped on siratro from nonrhizosphere
3347	ICRISAT	ICRISAT Center	B 9, Vertisol	E	F	N	IHP 347	Trapped on siratro from nonrhizosphere
3348	ICRISAT	ICRISAT Center	RW 1C, Alfisol	N	S	N	IHP 348	Trapped on siratro from soil
3349	ICRISAT	ICRISAT Center	RW 1C, Alfisol	N	S	N	IHP 349	Trapped on siratro from soil
3350	ICRISAT	ICRISAT Center	RW 1C, Alfisol	N	S	N	IHP 350	Trapped on siratro from soil
3352	ICRISAT	ICRISAT Center	RW 1C, Alfisol	N	S	N	IHP 352	Trapped on siratro from soil
3355	ICRISAT	ICRISAT Center	RW 2, Alfisol	N	S	N	IHP 355	Trapped on siratro from soil
3356	ICRISAT	ICRISAT Center	RW 2, Alfisol	N	S	N	IHP 356	
3358	ICRISAT	ICRISAT Center	RW 2, Alfisol	N	S	N	IHP 358	
3359	ICRISAT	ICRISAT Center	BW 4C, Vertisol	N	S	N	IHP 359	Trapped on siratro from soil

1	2	3	4	5	6	7	8	9
3360	ICRISAT	ICRISAT Center	BW 4C, Vertisol	N	S	N	IHP 360	Trapped on siratro from soil
3361	ICRISAT	ICRISAT Center	BW 4C, Vertisol	N	S	N	IHP 361	Trapped on siratro from soil
3362	ICRISAT	ICRISAT Center	BW 4C, Vertisol	N	S	N	IHP 362	Trapped on siratro from soil
3363	ICRISAT	ICRISAT Center	BW 4C, Vertisol	N	S	N	IHP 363	Trapped on siratro from soil
3364	ICRISAT	ICRISAT Center	BW 4C, Vertisol	N	S	N	IHP 364	Trapped on siratro from soil
3366	ICRISAT	ICRISAT Center	BW 3B, Vertisol	N	S	N	IHP 366	Trapped on siratro from soil
3367	ICRISAT	ICRISAT Center	BW 3B, Vertisol	N	S	N	IHP 367	Trapped on siratro from soil
3368	ICRISAT	ICRISAT Center	BW 3B, Vertisol	N	S	N	IHP 368	Trapped on siratro from soil
3369	ICRISAT	ICRISAT Center	BW 3B, Vertisol	I	S	N	IHP 369	Trapped on siratro from soil
3370	ICRISAT	ICRISAT Center	BW 3B, Vertisol	N	S	N	IHP 370	From a black nodule formed on siratro
3371	ICRISAT	Warangal, AP, IND	N	I	S	N	IHP 371	Trapped on siratro from soil
3372	ICRISAT	Warangal, AP, IND	N	E	F	N	IHP 372	Trapped on siratro from soil
3373	ICRISAT	Anantapur, AP, IND	N	E	S	N	IHP 375	Trapped on siratro from soil
3376	ICRISAT	Hisar, Haryana, IND	N	I	S	N	IHP 376	Trapped on siratro from soil
3377	JNKVV	N	N	E	S	N	IHP 377	
3381	JNKVV	N	N	E	S	N	IHP 381	
3382	JNKVV	N	N	E	S	N	IHP 382	
3384	JNKVV	N	N	E	S	N	IHP 384	
3385	JNKVV	N	N	E	S	N	IHP 385	
3386	JNKVV	N	N	E	S	N	IHP 386	
3387	JNKVV	N	N	E	S	N	IHP 387	
3388	JNKVV	N	N	E	S	N	IHP 388	
3389	JNKVV	N	N	E	S	N	IHP 389	
3390	JNKVV	N	N	E	S	N	IHP 390	
3391	JNKVV	N	N	E	S	N	IHP 391	
3392	JNKVV	N	N	E	S	N	IHP 392	
3393	JNKVV	N	N	I	S	N	IHP 393	
3395	JNKVV	N	N	E	S	N	IHP 395	
33%	JNKVV	N	N	E	S	N	IHP 396	
3399	JNKVV	N	N	N	S	N	IHP 399	
3400	JNKVV	N	N	N	S	N	IHP 400	
3401	JNKVV	N	N	E	S	N	IHP 401	
3403	JNKVV	N	N	E	S	N	IHP 403	
3404	JNKVV	N	N	N	S	N	IHP 404	
3481	ICRISAT	Adilabad, AP, IND	N	E	S	N	IHP 481	
3483	ICRISAT	Nagpur, MS, IND	Dark red soil	E	F	N	IHP 483	
3484	ICRISAT	Badnora, MS, IND	Light black soil	E	S	N	IHP 484	
3487	ICRISAT	Fugra, MS, IND	Light black soil	I	F	N	IHP 487	
3491	ICRISAT	Khedakem, MS, IND	Light black soil	E	F	N	IHP 491	
3497	ICRISAT	Haryana, IND	Entisol	E	F	N	IHP 497	
3498	ICRISAT	Haryana, IND	Entisol	E	F	N	IHP 498	
3499	ICRISAT	Haryana, IND	Entisol	E	F	N	IHP 499	
3500	ICRISAT	Haryana, IND	Entisol	E	S	N	IHP 500	
3503	ICRISAT	Jatalvayana, GR, IND	Light black soil	E	S	N	IHP 503	
3504	ICRISAT	Jatalvayana, GR, IND	Light black soil	E	N	N	IHP 504	

1	2	3	4	5	6	7	8	9
3506	ICRISAT	Unjha, GR, IND	Light black soil	E	F	N	IHP 506	
3507	ICRISAT	Radhanpur, GR, IND	Light black soil	E	F	N	IHP 507	
3508	ICRISAT	Radhanpur, GR, IND	Light black soil	E	F	N	IHP 508	
3515	ICRISAT	ICRISAT Center	BM 16C, Vertisol	N	F	N	IHP 515	Trapped on siratro after solarization
3516	ICRISAT	ICRISAT Center	BM 16C, Vertisol	N	F	N	IHP 516	Trapped on siratro after solarization
3517	ICRISAT	ICRISAT Center	BP11C, Vertisol	N	N	N	IHP 517	
3518	ICRISAT	ICRISAT Center	BP 11C, Vertisol	N	N	N	IHP 518	Trapped on siratro after solarization
3519	ICRISAT	ICRISAT Center	RM 8E, Alfisol	N	F	N	IHP 519	Trapped on siratro after solarization
3520	ICRISAT	ICRISAT Center	RM 8E, Alfisol	N	S	N	IHP 520	Trapped on siratro after solarization
3521	ICRISAT	VEN	N	N	S	N	IHP 521	
3522	ICRISAT	VEN	N	N	S	N	IHP 522	
3523	ICRISAT	VEN	N	N	S	N	IHP 523	
3524	ICRISAT	VEN	N	N	S	N	IHP 524, PR 6716	
3525	ICRISAT	MWI	pH 5, red gravelly	N	N	N	IHP 525	
3526	ICRISAT	MWI	pH 5, red gravelly	E	N	N	IHP 526	
3527	ICRISAT	MWI	pH 5, red gravelly	E	N	N	IHP 527	
3528	ICRISAT	MWI	pH 4, dark brown	E	N	N	IHP 528	
3529	ICRISAT	MWI	pH 4.5, dark brown	E	N	N	IHP 529	
3530	ICRISAT	MWI	pH 5, light red	E	N	N	IHP 530	
3531	ICRISAT	MWI	pH 5, light red	E	N	N	IHP 531	
3532	ICRISAT	MWI	pH 5, light black	E	N	N	IHP 532	
3533	ICRISAT	MWI	pH 4, light brown	I	N	N	IHP 533	
3534	ICRISAT	MWI	pH 5.5, light black	N	N	N	IHP 534	
3535	ICRISAT	MWI	pH 5, light black	N	N	N	IHP 535	
3536	ICRISAT	MWI	pH 5, red soil	E	N	N	IHP 536	
3537	ICRISAT	MWI	pH 5.5, red soil	E	N	N	IHP 537	
3538	ICRISAT	MWI	pH 5.5, red soil	E	N	N	IHP 538	
3539	ICRISAT	MWI	pH 7, light black	I	N	N	IHP 539	
3541	ICRISAT	MWI	pH 5, red soil	N	N	N	IHP 541	
3542	ICRISAT	MWI	pH 4.5, light black	I	N	N	IHP 542	
3543	ICRISAT	MWI	pH 4.5, light black	E	N	N	IHP 543	
3544	ICRISAT	MWI	pH 5.5, light black	E	N	N	IHP 544	
3545	ICRISAT	MWI	pH 5.5, light black	I	N	N	IHP 545	
3546	ICRISAT	MWI	pH 6, light black	E	N	N	IHP 546	
3547	ICRISAT	MWI	pH 5.5, light black	N	N	N	IHP 547	
3548	ICRISAT	MWI	pH 5, light red	N	N	N	IHP 548	
3549	ICRISAT	MWI	pH 5.5, light black	N	N	N	IHP 549	
3550	ICRISAT	MWI	pH 7, dark brown	N	N	N	IHP 550	
3551	ICRISAT	MWI	pH 4.5, red soil	N	N	N	IHP 551	
3552	ICRISAT	MWI	pH 4.0, light red	N	N	N	IHP 552	
3553	ICRISAT	MWI	pH 4.0, brown	N	N	N	IHP 553	

1	2	3	4	5	6	7	8	9
3554	ICRISAT	MWI	pH 5.5, light brown	N	N	N	IHP 554	
3555	ICRISAT	MWI	pH 4.0, black loamy	N	N	N	IHP 555	
3556	ICRISAT	MWI	pH 5.0, light black	N	N	N	IHP 556	
3557	ICRISAT	MWI	pH 5.0, red soil	N	N	N	IHP 557	
3558	ICRISAT	MWI	pH 4.0, dark brown	N	N	N	IHP 558	
3559	ICRISAT	MWI	pH 6.5, black soil	N	N	N	IHP 559	
3560	ICRISAT	MWI	pH 6.0, light black	N	N	N	IHP 560	
3561	ICRISAT	MWI	pH 5.0, red soil	N	N	N	IHP 561	
3562	ICRISAT	MWI	pH 5.0, light black	N	N	N	IHP 562	
3563	ICRISAT	MWI	pH 5.0, red soil	N	N	N	IHP 563	
3564	ICRISAT	MWI	pH 5.0, red soil	N	N	N	IHP 564	
3565	ICRISAT	MWI	pH 5.5, light black	N	N	N	IHP 565	
3566	ICRISAT	MWI	pH 4.0, dark red	N	N	N	IHP 566	
3567	ICRISAT	MWI	pH 7.0, black soil	N	N	N	IHP 567	
3568	ICRISAT	MWI	pH 7.0, light black	N	N	N	IHP 568	
3570	ICRISAT	MW1	pH 4.5, light red	N	N	N	IHP 570	
3571	ICRISAT	MWI	pH 5.5, light black	N	N	N	IHP 571	
3572	ICRISAT	MWI	pH 4.5, light red	N	N	N	IHP 572	
3573	ICRISAT	MWI	pH 4.5, red sandy loam	N	N	N	IHP 573	
3574	ICRISAT	MW1	pH 5.0, light red	N	N	N	IHP 574	
3575	ICRISAT	MWI	pH 5.0, red soil	N	N	N	IHP 575	
3576	ICRISAT	MWI	pH 4.5, dark brown	N	N	N	IHP 576	
3577	ICRISAT	MWI	pH 5.0, light black	N	N	N	IHP 577	
3578	ICRISAT	MW1	pH 5.0, red soil	N	N	N	IHP 578	
3579	ICRISAT	MWI	pH 5.0, light black	N	N	N	IHP 579	
3580	ICRISAT	MWI	pH 6.0, black soil	N	N	N	IHP 580	
3582	ICRISAT	MWI	pH 6.0, black soil	N	N	N	IHP 582	
3583	ICRISAT	MW1	pH 5.0, light black	N	N	N	IHP 583	
3584	ICRISAT	MWI	pH 5.5, light black	N	N	N	IHP 584	
3585	ICRISAT	MW1	pH 5.5, brown soil	N	N	N	IHP 585	
3586	ICRISAT	MWI	pH 5.0, black soil	N	N	N	IHP 586	
4001	NifTAL	N	N	N	S	Al	TAL 190, Niti62B14	Recommended for Trifolium alexandrinum
4002	HAU	N	N	N	S	Al	IHP 231, M 1	Isolated from Vigna radiata
4003	HAU	N	N	I	F	Al	IHP 232, M 3	Isolated from Vigna radiata
4004	HAU	N	N	N	S	Al	IHP 246, S 24	Recommended for mung bean inoculation
4005	UAS	N	N	N	F	Ac	IHP 256, UB 101	
4006	UAS	N	N	N	N	N	IHP 257, UB 104	
4007	UAS	N	N	N	F	Ac	IHP 258, UB 118	
4008	CSIRO	Marandellas, ZWE	N	E	S	Ne	IHP 259, CB 756, R 3824, TAL 309	
4009	RES	Marandellas, ZWE	N	N	S	Ne	IHP 264, CB 756, R 3824, TAL 309	
4010	HAU	N	N	E	F	Ac	IHP 265, R3	
4011	AU	N	N	I	F	Ac	IHP 289, AUB1	Recommended for black gram inoculation
4012	AU	N	N	E	F	Ac	IHP 290, Rh VI	Recommended for groundnut inoculation

1	2	3	4	5	6	7	8	9
4013	UWI	N	N	I	S	N	IHP 406, Tob 7C	
4014	UWI	N	N	E	S	N	IHP 407, Tob 9A	
4015	UWI	N	N	E	S	N	IHP 410, 5018	
4016	UWI	N	N	E	S	N	IHP 412, Tob 2C	
4017	UWI	N	N	I	S	N	IHP 413, 10003	
4018	UWI	N	N	N	S	N	IHP 414, 10004	
4019	UWI	N	N	E	S	N	IHP 415, 10006	
4020	UWI	N	N	E	S	N	IHP 417, 10008	
4021	UWI	N	N	N	S	N	IHP 418, 10009	
4022	UWI	N	N	E	S	N	IHP 419, 10010	
4023	UWI	N	N	N	S	N	IHP 420, 10011	
4024	UWI	N	N	E	S	N	IHP 421, 10012	
4025	UWI	N	N	I	S	N	IHP 423, M 10013(250K)	
4026	UWI	N	N	E	S	N	IHP 424, M 10013(250S)	
4027	UWI	N	N	N	S	N	IHP 426, 10016	
4028	UWI	N	N	N	S	N	IHP 428, 10017	
4029	UWI	N	N	N	S	N	IHP 429, 10019	
4030	UWI	N	N	N	S	N	IHP 430, 10020	
4031	UWI	N	N	N	S	N	IHP 431, M 10020(250K)	
4032	UWI	N	N	N	S	N	IHP 432, 10021	
4033	UWI	N	N	N	S	N	IHP 433, 10022	
4034	UWI	N	N	N	S	N	IHP 434, 10023	
4035	UWI	N	N	N	S	N	IHP 438, M 10027(250K)	
4036	UWI	N	N	N	S	N	IHP 440, 10028	
4037	UWI	N	N	N	S	N	IHP 441, M 10028(250S)	
4038	UWI	N	N	N	S	N	IHP 443, 10030	
4039	UWI	N	N	N	S	N	IHP 444, M 10030(250S)	
4040	UWI	N	N	N	S	N	IHP 446, M 10031 (250K)	
4041	UWI	N	N	N	S	N	IHP 449, 10034	
4042	UWI	N	N	N	S	N	IHP 451, 10037	
4043	UWI	N	N	N	S	N	IHP 452, 10039	
4044	UWI	N	N	N	S	N	IHP 453, 10044	
4045	UWI	N	N	N	S	N	IHP 456, 10048	
4046	UWI	N	N	N	F	N	IHP 457, 10049	
4047	UWI	N	N	N	S	N	IHP 458, 10053	
4048	UWI	N	N	N	S	N	IHP 462. 10058	
4049	UWI	N	N	N	S	N	IHP 463, 10063	
4050	UPan	N	N	N	S	N	IHP 469, P 130	
4051	UPan	N	N	N	S	N	IHP 470. P 136	

1	2	3	4	5	6	7	8	9
4052	UPan	N	N	N	F	N	IHP471,P153	
4053	UPan	N	N	N	S	N	IHP472,P 163	
4054	UPan	N	N	N	S	N	IHP 473, P 164	
4055	UPan	N	N	N	S	N	IHP 474, P 165	
4056	UPan	N	N	N	S	N	IHP 475, P 166	
4057	UPan	N	N	N	S	N	IHP 477, P 172	
4058	UPan	N	N	N	S	N	IHP 480, P 195	
4059	TNAU	N	N	E	S	N	IHP511.CC-1	Being tested in A1CPIP trials
4060	IAR1	IARI Campus	N	E	S	N	IHP 512. F 4	Recommended for commercial inoculation
4061	CSAUAT	N	N	E	S	N	IHP 513.KA 1	Being tested in AICPIP trials
4062	ARS-B	N	N	E	S	N	IHP 514.BDN -A2	Being tested in AICPIP trials
6001	ICRISAT	N. Sagar, AP, IND	N	N	S	N	NS 72	
6002	ICRISAT	ICRISAT Center	N	M	F	N		
6005	ICRISAT	ICRISAT Center	N	N	F	N		
6006	ICRISAT	ICRISAT Center	N	H	S	N		
6007	ICRISAT	N. Sagar, AP, IND	N	N	S	N		
6009	ICRISAT	Paise, MS, IND	N	E	S	N		
6012	ICRISAT	ICRISAT Center	N	M	S	Ne		
6014	ICRISAT	S.R. Patnam, KK, IND	N	N	S	N		
6024	ICRISAT	ICRISAT Center	N	N	S	N	Fb 103	
6027	ICRISAT	ICRISAT Center	N	N	S	N		Interspecific nodule
6030	ICRISAT	ICRISAT Center	N	N	S	N		
6034	ICRISAT	ICRISAT Center	N	N	S	N	Fb 43	
6035	ICRISAT	ICRISAT Center	N	N	S	N	Fb 47	
6036	ICRISAT	ICRISAT Center	N	N	S	N	Fb51	
6037	ICRISAT	ICRISAT Center	N	N	S	N	Fb 54	
6041	ICRISAT	ICRISAT Center	N	N	S	N		
6046	ICRISAT	ICRISAT Center	N	E	S	N		
6058	ICRISAT	ICRISAT Center	N	N	F	N		
6060	ICARDA	Himayatpur, BOD	Alluvial soil	N	S	N		
6071	ICRISAT	ICRISAT Center	N	N	S	N	PM 3/2/1 Big	
6072	ICRISAT	ICRISAT Center	N	M	S	N	Fb 103	
6073	ICRISAT	ICRISAT Center	N	E	S	N	Fb 105	
6101	ICRISAT	Nasik, MS, IND	Medium black soil	N	S	N		
6102	ICRISAT	Kolhapur, MS, IND	Medium black soil	N	S	N		
6103	ICRISAT	Kolhapur, MS, IND	Medium black soil	N	S	N		
6104	ICRISAT	Kolhapur, MS, IND	Medium black soil	N	S	N		
6105	ICRISAT	Pune, MS, IND	Medium black soil	N	S	N		
6106	ICRISAT	Kolhapur, MS, IND	Medium Black soil	N	S	N		
6107	ICRISAT	Kolhapur, MS, IND	Medium black soil	N	S	N		
6108	ICRISAT	Kolhapur, MS, IND	Medium black soil	N	S	N		
6109	ICRISAT	Vant, MS. IND	Red soil	N	S	N		

1	2	3	4	5	6	7	8	9
6110	ICRISAT	Vani, MS, IND	Red soil	N	S	N		
6112	ICRISAT	Rajkot, MS, IND	Red soil	N	S	N		
6113	ICRISAT	Ramkot, MS, IND	Red soil	N	S	N		
6115	ICRISAT	Rajkot, MS, IND	Red soil	N	S	N		
6116	ICRISAT	Rajkot, MS, IND	Red soil	N	S	N		
6118	ICRISAT	Rajkot, MS, IND	Sandy soil	N	S	N		
6119	ICRISAT	Chotaudaipur, MS, IND	Sandy soil	N	S	N		
6120	ICRISAT	Ramkot, MS, IND	Black soil	N	S	N		
6121	ICRISAT	Ramkot, MS, IND	Black soil	N	S	N		
6122	ICRISAT	Rajkot, MS, IND	Black soil	N	S	N		
6123	ICRISAT	Rajkot, MS, IND	Black soil	N	S	N		
6124	ICRISAT	Himatnagar, MS, IND	Sandy soil	N	S	N		
6127	ICRISAT	Kuksli, MS, IND	Black soil	N	S	N		
6128	ICRISAT	Barvani, MS, IND	Black soil	N	S	N		
6129	ICRISAT	Dhule, MS, IND	Dark brown soil	N	S	N		
6131	ICRISAT	Dhule, MS, IND	Medium black soil	N	S	N		
6132	ICRISAT	Jalgaon, MS, IND	Medium black soil	N	S	N		
6133	ICRISAT	Jalgaon, MS, IND	Medium black soil	N	S	N		
6134	ICRISAT	Jalgaon, MS, IND	Medium black soil	N	S	N		
6136	ICRISAT	Jalgaon, MS, IND	Medium black soil	N	S	N		
6137	ICRISAT	Jalgaon, MS, IND	Medium black soil	N	S	N		
6139	ICRISAT	Jalgaon, MS, IND	Medium black soil	N	S	N		
6140	ICRISAT	Jalgaon, MS, IND	Medium black soil	N	S	N		
7001	NCSU	BOL	Dark alluvial loam	E	S	Ne	NC 92	Recommended as commercial inoculant
7002	NCSU	BOL	N	N	S	Ne	NC 138.1	
7003	NCSU	BOL	Light brown sandy loam	N	S	Ne	NC 83.1	
7004	NCSU	BOL	Light red alluvial	M	S	Ne	NC 71	
7006	USDA	Virginia, USA	N	E	S	Ne	3G4B6	
7007	NCSU	BOL	Light brown sandy loam	E	S	Ne	NC 83	
7008	NCSU	ARG	Light brown alluvial	E	S	Ne	NC 62	
7009	NCSU	ARG	Dark alluvial gravel	M	S	Ne	NC 56	
7010	NCSU	BOL	Light brown sandy loam	E	S	Ne	NC 150.7	
7011	USDA	ZWE	N	M	S	Ne	3G4B20, Rhodesia 411	
7012	NCSU	BRA	Reduced gray calcareous	E	S	Ne	NC 7.2	
7013	NCSU	ARG	N	E	S	Ne	NC 6	
7014	NCSU	BRA	N	H	S	Ne	SMS-2	
7015	NCSU	BOL	Light brown sandy loam	H	S	Ne	NC 83.2	
7017	ARO	Betdegan, ISR	N	H	S	Ne	5a/70	Promising strain for groundnut
7018	NifTAL	N	N	N	S	Ne	TAL 483, UASB 96	
7019	NCSU	BOL	Deep red clay	M	S	Ne	NC 144.1	
7020	NCSU	BOL	N	M	S	Ne	NC 146.1	
7021	NCSU	BRA	Red black soil	E	S	Ne	NC 3.1	
7022	NCSU	BRA	Light sandy soil	I	S	Ne	NC 12	

1	2	3	4	5	6	7	8	9
7022	NCSU	BRA	Light sandy soil	I	S	Ne	NC 1.2	
7023	NCSU	BOL	Brown sandy soil	M	S	Ne	NC 138.2	
7024	NCSU	BOL	Brown sandy soil	M	S	Ne	NC 138.3	
7025	NCSU	ARG	Dark alluvial gravel	N	S	Ne	NC 56.1	
7026	NCSU	BRA	Calcareous	M	S	Ne	NC 23.2	
7027	NCSU	BOL	Brown alluvial clay-loam	H	S	Ne	NC 70	
7028	NCSU	BRA	Light sandy soil	I	S	Ne	NC 1.15	
7029	IAgron	BRA	N	E	S	Ne	SMS 176	
7031	NitCo	N	N	E	S	Ne	8A23	
7032	NitCo	N	N	M	S	Ne	8A44	
7033	NitCo	N	N	E	S	Ne	47 A1	
7034	NifTAL	Virginia, USA	N	E	S	Ne	TAL 176, Nit 8A 14	Poor competitor with native rhizobia
7035	NCSU	BRA	Light sandy soil	I	S	Ne	NC 1.12	
7036	RES	N	N	M	S	N	RCR 3946	
7037	RES	N	N	E	S	Ne	RCR 3958	
7038	RES	N	N	I	S	Ne	RCR 3981	
7039	N	Burma	N	E	S	Ne	297 A	
7040	CSIRO	N	N	H	S	Ne	CB 756	
7041	USDA	Virgina, USA	N	M	S	Ne	3G4b5	
7042	USDA	N	N	E	S	Ne	3G4b 16	Obtained at USDA from USAID
7044	NCSU	BRA	Light sandy soil	N	S	Ne	NC 1.8	
7045	NCSU	BRA	Calcareous	M	S	Ne	NC 23.3	
7047	NCSU	BOL	Brown alluvial clayloam	E	S	Ne	NC 70.1	
7048	NifTAL	1SR	N	M	S	N	TAL 464, 38b/70	
7049	NCSU	PRY	Deep white sand	I	S	N	NC 120.1	
7055	NCSU	N	N	I	S	N	NC 2	
7056	NCSU	BRA	Red black soil limestone	H	S	Ne	NC 3.2	
7057	NCSU	BRA	Calcareous	M	S	N	NC 23.4	
7058	NCSU	N	N	H	S	Ne	NC 43.3	Fast nodulating strain
7059	NCSU	ARG	Dark alluvial gravel	M	S	Ne	NC 56.2	
7060	NCSU	ARG	Alluvial red silty sand	I	S	Ne	NC 59.2	
7061	NCSU	BOL	Deep red clay	M	S	Ne	NC 146.2	
7062	NCSU	N	N	E	S	Ne	NC 157.2	
7063	N	N	N	H	S	Ne	St-2	
7064	N	N	N	E	S	Ne	Sm-1	
7065	NifTAL	1SR	N	E	S	Ne	TAL 465, 280A	
7066	NifTAL	N	N	M	S	Ne	TAL 481, UASB 94	
7067	RES	N	N	M	S	Ne	RCR 3957	
7068	RES	N	N	M	S	Ne	RCR 3976	
7069	NitCo	N	N	M	S	N	8A45	
7070	NCSU	BRA	Reduced gray calcareous	E	S	Ne	NC7.1	
7071	NitCo	N	N	M	S	Ne	176A34	
7072	AU	N	N	N	S	N	RH VI	

1	2	3	4	5	6	7	8	9
7075	USDA	Virginiaz, USA	N	M	S	N	3G4B4	
7076	NCSU	BOL	Medium heavy, dark brown	E	S	Ne	NC 151.4	
7077	NifTAL	N	N	N	S	N	TAL 184, Nit137B3	
7078	ARO-1	ISR	N	N	S	N	R/280A9	
7079	PPR1	N	N	E	S	N	XS-30	
7080	NCSU	N	N	M	S	Ne	32H1	
7081	NifTAL	N	N	E	S	Ne	TAL 466	
7082	NitCo	N	N	M	S	Ne	8A52	
7083	NCSU	N	N	N	S	Ne	Gan6E	
7084	N	N	N	E	F	N	NGR 234	
7086	N	N	N	H	S	Ne	27A	
7088	NCSU	N	N	I	S	Ne	Arg 2C	
7089	NCSU	N	N	E	S	Ne	Rob 3C	
7090	NCSU	N	N	N	S	Ne	Rob 3D	
7091	NCSU	N	N	N	S	Ne	2C	
7092	NCSU	N	N	N	S	Ne	Rob 3B	
7093	NCSU	N	N	E	S	N	Rob 3A	
7094	NCSU	N	N	M	S	Ne	Flo 1B	
7095	NCSU	N	N	E	S	Ne	Flo 1E	
7096	NCSU	N	N	N	S	Ne	Flo 1F	
7097	NCSU	N	N	N	S	Ne	Flo 1D	
7098	RES	N	N	M	S	Ne	R 3954	
7099	RES	N	N	I	S	Ne	R 3964	
7101	NCSU	N	N	N	S	Ne	Arg 2F	
7102	NCSU	Y	N	N	S	Ne	Arg 2A	
7103	NCSU	N	N	N	S	Ne	Flo 1C	
7104	NCSU	N	N	N	S	Ne	Arg 2D	
7105	NCSU	N	N	N	S	Ne	Flo 1A	
7106	NCSU	U	N	N	S	Ne	Gan 6F	
7107	NCSU	S	N	E	S	Ne	Rob 3E	
7108	RES	N	N	N	S	Ne	RCR 3947	
7109	CIAT	N	N	N	S	N	CIAT-2	
7113	NAPBA	N	N	H	S	Ne	RP182-13	Competitive with native rhizobia
7114	NifTAL	Hamakuapoko, NifTAL	Haplustoll	E	S	AI	TAL 1000	Sensitive to 4°C storage in peat

RA - 00209



ICRISAT

**International Crops Research Institute for the Semi-Arid Tropics
Patancheru, Andhra Pradesh 502 324, India**