Research achievements

since 1968, more than 1088 varieties including 72 hybrids have been released throught multi location testing for various agro-ecological systems prevalent across the country. Of these varieties, 503 are for irrigated areas, 133 for rainfed uplands, 194 for rainfed low lands, 44 for semi deep and 18 for deep water situation, 51 for high altitudes, 42 for saline and alkaline areas, 10 for aierobic, 19 for boro and 74 aromatic long and short grain varieties were released. More than 66 varieties have been developed by the Directorate of which 44 are central releases and the rest are released in different states. Globally 19 varieties released through AICRIP are being cultivated in 25 other rice growing countries.

Significant achievements during 2015-2016

New Varieties and Hybrids released

Forty two varieties and four hybrids were released during 2015-16 by Central Sub Committee on Crop Standards, Notification and Release of Varieties (CSCCSN & RV) and State Varietal release Committee (SVRC). Central Sub Committee on Crop Standards, Notification and Release of Varieties released 15 varieties and three hybrids (KRH 4, KPH 460 and ADV 8301). The State Varietal Release Committees

released 27 varieties; for Andhra Pradesh (1), Gujarat (2), Karnataka (2), Kerala (5), Maharashtra (1), Madhya Pradesh (1), Manipur (1), Telangana (3) Uttarakhand (4), and West Bengal (7). These high yielding varieties (HVYs) were

released
for cultivation
in
different
ecologies
viz
.,
irrigated, aerobic,
basmati,
rainfed
shallow
low
land,
deep water
and
coastal
saline
areas.
Many
of
these varieties
are
resistant/moderately
resistant
to biotic stresses.

Crop Improvement

- During the year 2015, 42 varietal, one screening nursery and three hybrid rice trials were conducted in 682 experiments at 160 locations in 27 states and 2 union territories covering all the 7 zones in the country.

In addition, 14 INGER nurseries involving 666 entries were tested at 58 centers.

- Forty two varieties and four hybrids were released during 2015-16 by Central Sub Committee on Crop Standards, Notification and Release of Varieties

(CSCCSN & RV) and State Varietal release Committee (SVRC).

- The varietal identification committee identified 14 varieties and 3 hybrids for release in different states across ecologies.
- Of the 666 entries were tested in 14 INGER nurseries, 61 were found promising based on phenotypic acceptability and yield for multi location testing.
- Breeder seed production (BSP) of 217 rice varieties and parental lines of 8 rice hybrids was organized at 43 centers across the country as per the DAC indents. A total production of

7757.42 quintals of breeder seed was achieved against the target of 4328.42 quintals, thus marking 79% more than the indented quantity. At IIRR center, 11 varieties and A,B and

R
lines
of
DRRH-3
were
included
in
breeder
seed
production with
a
total
production
of
160.82
quintals against the target of 87.30 quintals

Agronomy

- Among nutrient management methods, Leaf Color Chart (LCC) based N application resulted in highest yield across all the locations closely
followed

by

150% recommended fertilizer dose.

- The evaluation of crop establishme nt methods

a

long

with

different

nutrient combinations over ten locations clearly indicated superiority of System of Rice Intensification
(SRI)

(4.7
t/ha)
over

direct seeded with SRI principles (4.26 t/ha).
- Site Specific Nutrient Management (SSNM
) results
based
on
Nutrient Expert
revealed that,
it
was
effective
in
increasing
the
yield in
all
the
locations.
Over
all

mean
yield
was 5.49
t/ha
under
same
treatment
followed
by
SSNM based on LCC (5.32 t/ha).

- Mechanized System of Rice Intensification (SMSRI) showed better performance with overall mean grain yield in all locations (5.49 t/ha) followed by manual hand

transplanting in lines and crop management for puddled transplanted rice (SRI) (5.26 t/ ha).

- The economical and efficient dose of new combination herbicide *i.e.,* Penoxsulam + Butachlor @717.5 g a.i./ha was effective for control of weeds in transplanted rice.
- The high yielding varieties, Mandyavijaya and Dhanrasi exhibited better we ed suppressing

ability.

Hybrids

and

long duration high yielding varieties were found to have better weed suppressing ability over short duration varieties.

- RDF + split application of N resulted in highest kharif rice yield (5.0 t/ha) followed by Azotobactor + PSB + brown manuring with Dhaincha + residue mulch @ 2 t/ha +75% RDF. Location specific recommended practices

of

NPK

+

ZnSO4

(100:50:50:20) at Mandya location recorded highest yield (7.91 t/ha) than rest of the treatments.

Soil Science

- Yield gap analysis highlighted the steep gaps in yield obtained from the fields receivingrecommended

fertiliser

dose (RDF) and farmer fertiliser practice (FFP) which
necessitates
site
specific nutrient management to realize the uniform
best. There was an increase in rice grain

yield from
45
to
140
%
in
nutrient
expert
(NE) tool based recommended plots compared to absolute control. Increased rice yield to an extent of 60-95 % was recorded in gypsum ameliorated sodic soils in Kanpur.

The highest
yields
were
recorded
in
DRR

Dhan 43 (4.37 t/ha), CSR 36 (4.26 t/ha), GSR 129 (4.24 t/ha) and DRR Dhan 42 (4.19 t/ha) with 100% GR supplementation.

- Genotypes 27P-63, PA 6444 and US 312 recorded significant rice yield in limed acid soils of Moncompu.

Increased yield due to liming

was

also

recorded

in

GSR

148, GSR 119 and DRR Dhan 43 at Ranchi and Aghonibora, US 312, 27P36 and PA 6444 at Titabar.

- The positive interaction effect of water and nutrients through increase in yield was recorded in aerobic

rice.
Water
productivity (kg
grain/ha
mm
water
used)
ranged
from 4.4
–
5.1
kg
grain/ha
mm
water.
There
was
10-14
%
saving in

water requirement with 100 and 75% cumulative pan evaporation (CPE) irrigation, respectively over 150% CPE. Application of nutrients up to 180 kg N, 60

kg
P2O5
and
100
kg
K2O/ha
significantly improved the grain yield.

- Consistent superiority of conjunctive use of RDF+5t FYM/ha was maintained at MTUand TTB in *kharif* and *rabi*

seasons in
a
long
term
experimentation
of
27
years.
The
highest enzyme
activity
of
phosphatase,
glucosidase and
dehydrogenase was
observed
in
the
reatment
receiving

FYM
at
10t/ha,
NPKZnS +
FYM,
and
50%NPK +
25%
GM-N
+
25% FYM-N
in
Maruteru
and
Titabar
as
well.

- The supremacy of transplanted r
ice

in production

over

DSR

and

aerobic

rice

by an extent of 13-46% was witnessed across locations namely IIRR, Kanpur, Moncompu and

Puducherry.

In

case

of

nutrient management practices, maximum yields were obtained with RDF+ organics at IIRR and Puducherry and with RDF at Kanpur and Moncompu.

Plant Physiology

- A total of 45 trials of plant physiol ogy AICRIP were conducted at 13 locations (6 funded and 7 voluntary centres) spread across India during *Kharif* 2015.

- The mean grain yield recorded after h arvest was increased by 9% by Imidazole (T2) application and Silixol treatment enhanced the mean grain yield for all varieties and locations

by

>8%

over

control

treatment (T1).
Application of Imidazole and Silixol had reduced the incidence of Blast and both the treatments are effective.

- IET 23356 recorded higher yield u nder elevated

temperature

followed

by

the entries
viz.,
IET
23354,
PA-6129,
IET
23947 IET 23339 and Somali. Based on the heat tolerance indices entries like DRRH-106, DRRH-107,

IET
24075,

Somali,
IET23979, and
IET
24082
could
be
selected

as
relatively heat tolerant genotypes.

- RUE and NUE in Rice: Sampada x J aya/2 (G3), BPT-5204, Sampada and Varadhan x MTU1010/2 (G5) showed high NUE (<5% reduction in grain yield under low N). The lines derived from the crosses Varadhan x BPT 5204/10 (G2),Varadhan x BPT-5204/6 (G2), Sampada x Jaya/3 (G4), Varadhan and Jaya showed high YSi value with non-significant stability variance (σi2) performed well across locations and produced higher grain yield under 50 kg N ha-1.

- Based on drought tolerance indices (DTI)
the entries IET25108, IET24679, Narendra-97, IET25134, IET25141 and IET 25104 showed high DTI values and are relatively drought tolerant.
- Based on multiple abiotic stress to lerance under
both
laboratory
and
field conditions the entries

viz.,

IET23216,

Somali,

IR 82635-B-B47-1 and IET24674 were

found to posses higher tolerance to salinity, drought submergence and low temperature.

Entomology

- Pest surveys undertaken at 29 loc ations revealed reports of outbreaks of BPH from Sakoli,Rajendranagar and Pantnagar. Caseworm damage to entire crop was observed at Sakoli, Moncompu and Karjat. Outbreak of army worm, *Mythimna separata* was reported at Khudwani.

- Host plant resistance studies compris
ed
of
1832
entries
evaluated
against
12
insect pests
in
201
valid
tests
(47
greenhouse reactions+154
field
reacti
on
s).
T

he
results
of these
reactions
identified
52
entries
(
2.8% of
the
tested)
as
pr
omising
against
various insect
pests.
O
f
these

6
entries
(
11.
5%
)
were under
retesting.

- Insecticide Evaluation Trial (IET) carri
ed o
ut at
34
locations
revealed
that
the
performance of
flubendiamide plus
thiacloprid
@

120
g a.i./ha was at par with the standard check insecticide

rynaxypyr

against

stem

borer and

leaf

folder,

while

against

gall

midge all
the
treatments
were
at
par.
DPX-RAB 55

@

25

g

a.i./ha

followed

by

standard check dinotefuran were effective against planthoppers and leafhoppers.

- Botanical Insecticide Evaluation

Trial (BIET) carried out at 24 locations revealed that
Neemazal
and
Nimbecidine
were
found effective
against
stem
borer.
Against
sucking pests-BPH,
WBPH
and

GLH,
botanicals were moderately effective. The botanical treatments were relatively safer to BPH predator-mirid bug than spiders.

- In the trial on Effect of Planting Dates on Insect Pest incidence (EPDP) conducted at 20 locations pest incidence was moderate to severe across locations

and
relatively
high
in late planting.

- Monitoring of species composition of stem borer revealed the presence of four species distributed

over

15

locations

with

YSB being dominant in 12 locations.
Tetrastichus schoenobii
was the dominant egg parasitoid followed by

Trichogramma
and
Telenomus
sp.
Anagrus
,
Oligosita
and
Gonatocerus
were the parasitoids reported on hopper eggs.

- Ecological Engineering for Pest Mana gement (EEPM) taken up in four locations showed that combination
of
organic
manuring, alleyways, spacing and water management and
growing
of

flowering plants
on
bunds increased

the

natural

enemy

populations like mirids, spiders and coccinellids and increased egg parasitisation.

- Bio intensive pest management trial (BIPM) initiated in four locations showed that the pest incidence was either reduced in (BIPM) or on par compared to Farmers' practice. There
was
also

an
increase
in
natural
enemy population in the BIPM plots.

- Yield Loss Estimation Trial (YLET) ca rried out at 7 locations revealed a significant negative

relationship

between

per

cent white

ears

due

to

stem

borer

and

grain yield.
Pooled
analysis
showed
that
for
every 10% increase in white ears there was 3.09 g reduction in grain yield per hill.

- Integrated Pest Management special (IPMs) conducted at 10 locations revealed that adoption of IPM practices reduced the

incidence

of

gall

midge,

BPH

and

stem borer
damage
at
respective centers. IPM practices also reduced the severity of major rice diseases. Weed population and weed biomass
were

also
considerably
reduced. Due to reduced pest incidence, grain yield was
significantly
high
in
IPM
plots
resulting in higher BC ratios.

- Population dynamics of major insect pests assessed through light trap at 30 centers indicated
that yellow stem
borer and planthoppers continued to be major pests
.

Plant Pathology

- Of 2474 entries in five different screening nurseries, the number of promising entries were 51 for leaf blast, 26 for neck blast, 56 for sheath blight, 56 for brown

spot, 9 for sheath
rot,
58 for bacterial
blight,
27 for rice tungro virus, 40 for leaf scald and 26 for grain discolouration.

- Of the 1015 germplasm accessions evaluated, two entries showed resistance to more than one
disease
viz.,
IC
No.
211168
(blast
and brown spot) and 217196 (brown spot and sheath blight).

- Monitoring of field virulences of

blast pathogen revealed minor shift in the pathogen population.Bacterial blight pathogen data indicated a major shift in virulence profile at Aduthurai, Maruteru,

Patna, Navsari, Kaul and Raipur.

- The combination fungicide

ICF-110 (tricyclazole
45%
+
hexaconazole
10%
WG) both mean disease severity and incidence of leaf blast, neck blast, sheath blight, sheath rot
and
leaf
scald.
The
combination
product, Merger (tricyclazole 18%+ mancozeb 62% WP) 2.5 g/l proved

effective against leaf blast, neck blast, sheath blight, brown spot and sheath rot.

- The data on special IPM trial indicated that adoption of IPM practices reduced the progress of disease severity of major diseases compared to farmers' practices. The highest disease

severity

was

(BLB-56.50%,

ShB-31.37%)
observed
in
case
of
the
fields
where farmers practice was followed compared to BLB-11.31% and ShB-31.37% in plots where IPM was practiced.

- The trial on false smut with three different dates
of

sowing
revealed
high disease infection

at

Ludhiana

and

Titabar

when crop
was
sown
on
1st
and

2nd week of June. Among the hybrids tested, KRH 2 was highly susceptible across the locations followed by DRRH 3 and US 312.

- Production oriented survey conducted in 18 states of

India
indicated
that
diseases like
blast,
neck
blast,
brown
spot,
sheath blight,
sheath
rot,
false
smut
and
bacterial blight
were
wide

spread
in
low
to
moderate intensity
across
the
country.
Bakanae
has become
a
problem
in
Haryana,
Himachal Pradesh,
Jammu
and
Kashmir

and
Punjab. A
new
disease
called
crown
rot
caused
by Erwinia
chrysanthemi
was
reported
fromdifferent districts of Telangana.

Transfer of Technology

- A cafeteria of rice techno logies were demonstrated in 449 hectares area covering 19 states and five major rice ecosystems of

the
country.
Out
of
449
Front
line demonstrations
(FLDs),
about
62%
were
conducted
in
irrigated
rice
ecosystem

and 16.7% of FLDs were conducted in rainfed uplands. More than 10 % of FLDs were organized in

shallow
lowlands
and
2.23%
in
hill
ecologies.
About
5.68%
of
the
FLDs
were
conducted in areas with problem soils.

- During the year 2015-16,

RKMP – IIRR in collaboration with C-DAC Hyderabad has developed a series of mobile apps for the benefit of Indian Extension Pr ofessionals and Farmers. Under Rice Knowledge Management

Portal

(RKMP)

activities, an extension interface / platform is being developed for extension professionals of the country.

- As part of ICAR-IRRI work

plan
GRiSP Theme

6,

an

innovative

participatory extension method
(RiceCheck)
has
been piloted
in
Telangana
and

Tamil Nadu
for identifying the key checks and practices.

Lead Research

Crop Improvement

Plant Breeding

- IET 23832 (RP 5886-HP 3-IR80463-B39-3), the first zinc rich

variety
was
released
by CVRC.
It
has
high
zinc
content
(
22
ppm) in polished rice with mean yield of 5.2 t/ha and Recommended
for

Tamil
Nadu,
Andhra Pradesh, Telangana and Karnataka under irrigated ecology.

- Five future generation r ice

lines

(FGR) possessing 6.5 to 7 t/ha yield potential were developed by utilizing tropical *japonicas.*

- DRR dhan 46 with 22.7% y

ield
gain
over
the check Sahbhagidhan was released by CVRC for the states of Bihar, Madhya Pradesh and Maharashtra.
Two
drought
tolerant
varieties namely Tripura Kharadhan 1 and Tripura Kharadhan 2 were released in the state of Tripura.

- Chinsurah Nona Dhan 2, a

derivative of *O. nivara* was found suitable for coastal saline areas and released in West Bengal.

- Three lines *ie.*, RP 5434-RAU 26-4, RP 5433- RAU-27-17 and RP 5433-RAU-19-2 with > 5 t/ha yield possessing good cold tolerance at seedling stage were identified.

- An elite culture derived fro m t he cross IR 64/ACC 2190 was found promising having resistance to planthoppers in field

and
green house conditions.
- IET 24395 derived from th
e
cross
MTU
1075/ MTU
1010
was
found
to
be
superior
over the
best

varietal
and
hybrid
checks
with
>5%
yield
advantage
and
promoted to
final year
of
testing
in
AVT-2-

Late
trial
proposed during
kharif
, 2016.

- Two rice based products *viz*
.,
tooth
pain relief
gel
and
mosquito
repellent
lotion

were developed utilizing rice bran oil and brown rice extract. Rice based baked products namely

cake,

cookies,

pie

crusts,

muffins and doughnuts

developed using rice bran oil spread (RBOS) were found to be superior in terms of consumer preference compared to

those

made

from

vanaspathi

ghee

and rice bran oil. Most of them contained low amount of transfats.

- In vivo Glycemic acid (GI) studies
revealed low GI in Dhanrasi (59.3) and Sampada (56.8) rice

varieties.

- Lines with good kernel e longation
after cooking (16 to 20 mm) were generated from the

crosses

Vasumathi/IET

19492,

Pusa 1121/IET 18990, Sugandhamati/IET 19492, IET 18033/

IET
18004
and
IET
18033/
IET 19492
etc
.

- Three land races/wild rices

of

North eastern region
viz.,

Punshi, Moirang-Phou-Khokngangbi and Thangjing-Phou were found to be resistant with score 3 in Uniform Blast Nursery.

- Genetic studies revealed quantitative nature of sheath blight tolerance. Employing

SSRs putative quantitative trait loci were identified in the donor, RP 2068-18-3-5. A single minor QTL was detected

on
chromosome
5
with 7.8 % phenotypic variance.

- Studies on grain chal kiness

indicated decrease

in

amylose

content

while amylopectin increased with the increase in chalky area percentage. The grain density was less in varieties cultivated at high temperature

Hybrid Rice

- DRRH-92 successfully co mpleted two years of testing in AICRIP trials (IHRT-MS). It is a high yielding hybrid with MS grain type having BPT 5204 grain type quality traits and medium duration. It showed yield superiority over the

checks on in Zone III & VI.
- IET No 25352 (RP 5933 -1-19-R-2)
derived from

partial

restorer

improvement programme was

promoted

to

AVT-1 medium duration trial. The IET 25352 registered yield superiority over best check in zone IV with 34.63% and in zone V with 12.18% and ranked third in the trial.

- In the station trial during *kharif*

2015,
10 promising
hybrids
viz

.,
APMS
6A/TCP- 583,
APMS
6A/TCP-647,
IR
68897A/TCP-
643,
APMS
6A/19-18R,
IR

79156
A/19-18R, APMS
6A/7-65R,
APMS
6A/PRP-78,
IR 79156
A/
PRP
78,
APMS
6A/PRP
123
and IR 79156 A/AR 9-21R were identified.

- In the biotic & abiotic resist

ance
breeding for parental line
improvement, two popular
maintainer
lines
viz
.,
IR58025B
and
APMS6B were
fortified
with
BB
(
Xa21

)
and
blast
(
Pi2
) resistance
genes;
attempts
are
being
made
to transfer the major drought tolerance QTL, qDTY12.1 and the low P tolerant QTL into the genetic background of the

improved version
of
the
elite
restorer
line,
RPHR1005R, possessing Xa21
+ Pi54.

Biotechnology

- Promising Bt transgenic I R64 lines with Cry1Ac and BPT 5204 transgenic lines with DREB1A are under

evaluation of transgene integration through Thermal Asymmetric Interlaced Polymerase

Chain

Reaction (TAIL-PCR).

- A sucrose synthase locus LOC_Os2g58480 was identified as polymorphic in two mapping populations *viz*

., Rasi / Vibhava and BPT5204/PTB1, and expression studies revealed its association with yield per se.

- A set of hyper-variable genomic and EST-SSR markers (n = 36), GATA motif specific SSR markers (n

=
14)
and
hyper-variable
genomic SSR
markers
(n
=
52)
have
been
identified to
be
highly
informative with

respect
to assessment
of
parental
genetic diversity
and prediction
of
heterosis
in
the
hybrids.

- Targeting a 20-bp polymorphism
in
the candidate gene for

WA-CMS trait,
WA352
, located in the mitochondrial genome of rice, a robust, co-dominant functional marker, named RMS-3-WA352 has been developed and validated among all the WA-CMS lines and maintainer lines of rice.

- In a study on wild aborti ve-cytoplasmic male sterility (WA-CMS), a co-dominant marker
was
developed

named RMS-PPR9-1,targeting an indel polymorphism in fertility restorer gene *Rf4*, *viz*., *PPR9.*

- Ten SNP markers were developed

by targeting four key genes playing important role

in
starch
bios
synthesis
through
KASPER assay.
These
SNP
markers
were
validated
in 100
indica
genotypes
and

high
allele
call
rate
(95.31%) was achieved with
distinct classes.

Crop Production

Agronomy

- The total labour input savings was 21-25% in Mechanised

System of Rice Intensification (MSRI) as compared to SRI. MSRI and SRI performed similarly with respect to

B:C
ratio.
- Leaf Color Chart (LCC) based
nitrogen management practice resulted significantly higher gross
returns,
net returns
and B:C ratio as compared to other nitrogen management practices except Soil Test Crop Response (STCR) based nitrogen management practice.
- The major nutrient uptak

e in grain and straw increased with increase in fertilizer dosage along with addition of biofertilizers. The highest uptake of major nutrients was at 125% RDF +

Biofertilizers
and
lowest
with
75% RDF.

- In bio-fortification screeni
ng tri
al,

lines- BLVR 86, 70, 349, RPHP 105, 106 were promising with respect to growth and yield parameters.

Soil Science

- Grain yield performance and several NUE indices indicated that the genotypes Tulasi, Rasi and Vikas from early; KRH2 and Varadhan from medium and Dhanrasi from long duration group were the most. GSR lines

viz

.,
HUANGHUAZHAN,
TME 80518,
and
IRRI
105
exhibited
efficiency at sub-optimal N level (N0) and responded to applied N (N 100).

- N O emissions were significantly reduced

from
the
rice
field

by
use
of
all the
three
nitrification inhibitors
namely, Dicyandiamide
(DCD),
Neem
Coated

Urea (NCU) and Karanjinas compared with urea. Total N_2O–N emissions were the highest with urea (0.73 kg/ha) followed

by
Karanjin + Urea
(0.62 kg/ha).
The highest
inhibition of
total
N
2
O emission
(53%)
was
recorded from plots treated with
Urea + DCD.

- The inoculation with *Gluconacetobacter*

diazotropicus
was found to improve the
seedling
leaf water content (39.4%)
and reduced

electrolyte

loss

(58.1%)

under water
deficit stress
in

comparison
with uninoculated

seedlings

which

showed 27.4% and 61.6%, respectively.
Inoculation was also found to improve the recovery of plants after resuming irrigation.

Plant Physiology

- Correlation and regression studies indicated that

Pn

is

positively

associated

with carboxylation

efficiency,
gs
and
ETR.

The
positive
association
with
ETR
and
PN
indicate that
this
parameter can

be
used
to
screen large
number
of
genotypes
as
measuring
ETR is faster.
The
PN
was
significantly
associated with

TDM
and
grain
yield.

- Multiple regression analysis based on lmg (Lindeman, Merenda and Gold) metric indicated that the carboxylation

efficiency (P

N

/C

i

)contributed

>30%

to

the

R
2

value of 0.86 followed by transpiration (14%) and ETR(11%).

- **Based on the ideotype breeding experiments in rice**

, it was found that KRH-2, PHB-71 and 13-7 (hybrids cluster), Jaya, Swarna and Sampada *(indica* cluster) and TJP-27, TJP- 197 and TJP-139 (tropical *japonica* cluster) can serve as

potential
donors
to
get
increased grain yields with
good grain quality
and ideal morpho-physiological
traits associated with grain
yield.

Crop Protection

Entomology

- Of various breeding lines

and

germplasm accessions evaluated against hoppers, PTB 33, RP 2068, T12 and IC216750 were highly resistant to BPH, *Nilaparvata lugens* . The entries M O1, IC75864 and IC215298

were
resistant
to WBPH,
Sogatella furcifera
.

- The back cross inbred line RP5588-B-B-B-63 developed from
O.□□ glaberrima□□
recorded low damage for stem borer,
Scirpophaga incertulas
suggesting antibiosis as one of the mechanisms of resistance.
- RP5588-B-B-B-32 derived

from
O.glaberrima and
a
BPT
mutant
been
identified as
a
new source
of
resistance
to
Asian
rice
gall

midge,
Orseolia oryzae
with nil damage under
greenhouse.

- Thirteen Backcross Inbr
ed
Lines
(BILS) derived from a cross
between Swarna (
O.sativa
)
and
a
wild
accession

O.
nivara –
81848, 11 mutant lines and 7 germplasm entries recorded low damage by leaf folder, *Cnaphalocrocis medinalis.*

- A newer insecticide BCS CL 73507 SC 200 was found effective in reducing the damage by stem borer, *S.*

incertulas
and
leaf
folder,
C. medinalis
in rice under field
conditions.

- Lemongrass, eucalyptus,oregano
and camphor
oils
at
0.2%
significantly reduced stem
borer(

S. incertulas) and leaf folder, *C. medinalis* damage and their efficacy was comparable with insecticide rynaxypyr.

Olfactory response of BPH, *N.lugens* to various oils revealed that eucalyptus oil at 10µl and neem oil at 20

µl were highly repellent to female hoppers. In EAG test, highest reaction (repellent) by hispa, *Dicladispa armigera* was recorded in eucalyptus oil followed by camphor and rosemary oils.

- The mean parasitisation of brown planthopper, N. *lugens* eggs near a border of yellow

marigold, orange marigold and Gaillardia
was
significantly higher
when compared to
parasitisation without flower border. Laboratory studies on biology of Anthocorid predator revealed that the bug was predominantly an egg predator on BPH, *N.lugens*

.

- The pink stem borer (PSB) *Sesa*

,

mia *i*
nferens
lure resulted in cumulative catches of PSB. Entomopathogenic

nematode

(EPN), *Heterorhabditis* *indica*

significantly reduced white ear damage caused by the yellow

stem

borer

in

field

evaluation. An

indigenous

EPN,

isolate

Drr-Ma3 was identified as *Metarhabditis amsactae* based on morphological and molecular characterization.

- Two genotypes (LD24 and Khao Pahk Maw) showed highly resistant reaction to rice

root- knot nematode
,
Meloidogyne graminicola
. Nematode analyses in SRI system revealed that the total nematode abundance was more in SRI compared to the normal transplanted system.

Pathology

- The blast resistant genes like *Pi1*,

Pi2
and
Pi54
were introgressed into elite cultivar Samba Mahsuri and Introgressed lines are under evaluation for blast resistance.

- Sheath blight tolerant lines
viz.,
SM-801, Ngonolasha,

Wazuho

phek,

Gumdhan, BG-380-2, RP-2068-18-3-5, Phougak and Thangmoi

were identified

from

North Eastern India.

- Among the cultivars evaluated under glass house conditions on three

different sowing dates
viz
., early, mid and late for false smut disease, the genotype HKR 47 showed high number of smut balls (10 Nos.)

- Isolated microbial antagonist's

viz
., Fluorescent
Pseudomonas
sp,
Trichoderma viride, *Penicillium*

sp.

and

Aspergillus
sp. and these were tested for their antagonistic activity

against

Rhizoctonia
solani
under
in vitro
conditions and found effective

in suppressing the growth of the fungus.

- Pyramiding of *Xa21* and *Xa38* in background of Samba Mahsuri and APMS6B is being carried out and lines are at BC4F

1
(Samba Mahsuri) and BC
3
F
1
(APMS6B).

- Genotyping and phenotyping of BB isolate 392 *Xoo* strains have been completed

and categorized into 22 pathotypes.

- The combination fungicide

ICF-110 (tricyclazole 45% + hexaconazole 10% WG) 1.0g/l was identified as an

effective
molecule to reduce the blast and sheath blight disease of rice.

Transfer of Technology

- The major threats to s ustainable rice production technologies in Chattisgarh plain zone as perceived by farmers are non availability of resistant varieties, poor drainage, nutrient deficiency, slow seed replacement, labour problems, non availability of

micro nutrients and biofertilizers in time and increased cost of tubewells.

- Gender dimensions stu dy

in

farmers indicated that the major work related to agriculture was predominantly decided by male members of the family.
Regarding the climate change they

perceived
that
in
Ranga Reddy district 2013 was
a good year for rice cultivation,
followed
by
2014
as
average
and 2015 as a bad year in
which rice area was reduced by
40 % and 75 %, respectively.

- The video extension mod
ule

studies
in Telangana and Rice check programme studies

in

Tamil

Nadu

indicated

that

in both these provinces, impact

of knowledge interventions was found to be significant when blended with field demonstrations.

- Adequate training in the agribusiness related area, effective marketing strategies, extension efforts such as technology demonstration

and
dissemination
strategies, value addition
initiatives were the critical
success

factors

in

the

public-private partnership in
agricultural extension and
advisory services.

- The baseline study in village Ankushapur District Karimnagar revealed that though farmers are aware of IPM as a

concept, they are not aware of the important IPM components to be followed in rice.