



NATH SEEDS®

Nath Bio-Genes (I) Ltd.

(CIN L01110MH1993PLC072842)

27th Sep 2018

The Manager-Listing
BSE Limited
Phiroze Jeejeebhoy Towers,
Dalal Street,
Mumbai-400001

The Manager-Listing
National Stock Exchange of India Ltd.,
Exchange Plaza, Bandra-Kurla Complex
Bandra (E)
Mumbai-400051

BSE Code-537291

NSE Code-NATHBIOGEN

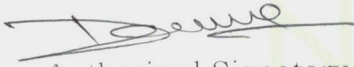
Subject: Presentation on Analysts' / Investors' meet

Please find the attached herewith Presentation of Nath Bio-Genes (India) Limited on Analysts' / Investors' meet to be held on 28th September 2018.

This is for your information and record purpose.

Thanking You.

Yours faithfully,
For Nath Bio-Genes (India) Limited


Authorised Signatory

NATH SEEDS
हर बीज खरा, शक्ति भरा



WELCOME



Nath Bio-Genes (I) Ltd.

हर बीज खरा, शक्ति भरा®

LEADING SEED COMPANY



- Fusion Bt. Technology
- Bristled Bajra
- Thick Skinned Tomatoes
- Industrial Rice.



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**We serve Farming
Community.**



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Seed Industry has to play a pivotal role in making Farming profitable.



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Seed is highly technical / advance bio-technology.

- Technology embedded
- Power Packed
- Custom designed Seed



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FOCUS CROPS

❖ Cotton

❖ Paddy

❖ Bajra

❖ Maize

❖ Mustard

❖ Wheat

❖ Tomato

❖ Okra

❖ Gourds

❖ Cucumber

❖ Brinjal

❖ Chilli



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NOVEL SEGMENTS



COTTON

- ✓ Drought Tolerance
- ✓ Sucking pest resistance
- ✓ Climate resilient



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NOVEL SEGMENTS



PADDY

- Industrial Rice – Poha
- Low Glycemic Index Rice



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NOVEL SEGMENTS



BAJRA

- **Dual purpose – Fodder and Grain.**



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NOVEL SEGMENTS



VEGETABLES

➤ **Virus tolerant.**



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SEED IS A COMPLEX BUSINESS



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WHAT MAKES US STAND OUT



- ❖ Passion
- ❖ Bringing a talented, Passionate, young and vibrant team together.

To do so we have seasoned stalwarts driving the mission of bringing the best genetics for our farming community.



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LEADERSHIP TEAM



- Dr. Satish Raina - Technology
- Dr. Ish Kumar - Paddy and FC
- Dr. C.S. Pathak - Vegetable Research
- Mr. Madhav Dhande - Leading the marketing
- Mr. Devinder Khurana - Our CFO



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INTERNATIONAL & NATIONAL RESOURCING.



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- We are geared up to grow consistently.
- Working on future trends in Agriculture is a Challenge and We like it.



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EXPORT



➤ New Horizons - Africa and Philippines



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THANK YOU



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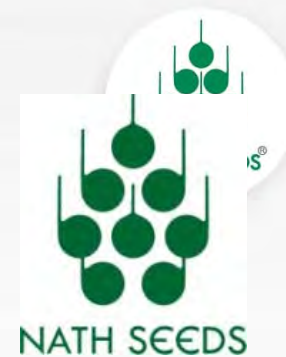
Brief R&D Review



Shaping the Future

NATH SEEDS (P) LTD.
September 28, 2018

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Cotton

Mission: Second to None



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India is the world's biggest cotton producer with 8 million farmers buying 50 million seed packets of 450 gm each annually to plant on 12.26 million hectares of land.

Economic Times, March 2018

India to be largest cotton producer in 2018-19: USDA

22 June 2018

For the fourth consecutive season, India is expected to be the largest producer of cotton in 2018-19, with the crop projected at 28.5 million bales, unchanged from the previous year, according to the latest US department of agriculture (USDA) cotton projections for 2018-19.

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India is forecast to account for 24 per cent of the world's

Cotton Breeding Priorities



Top Priority Areas

- High Degree Sucking Pests Tolerance
- Enhanced Tolerance to Water Stress
- Assured Yields

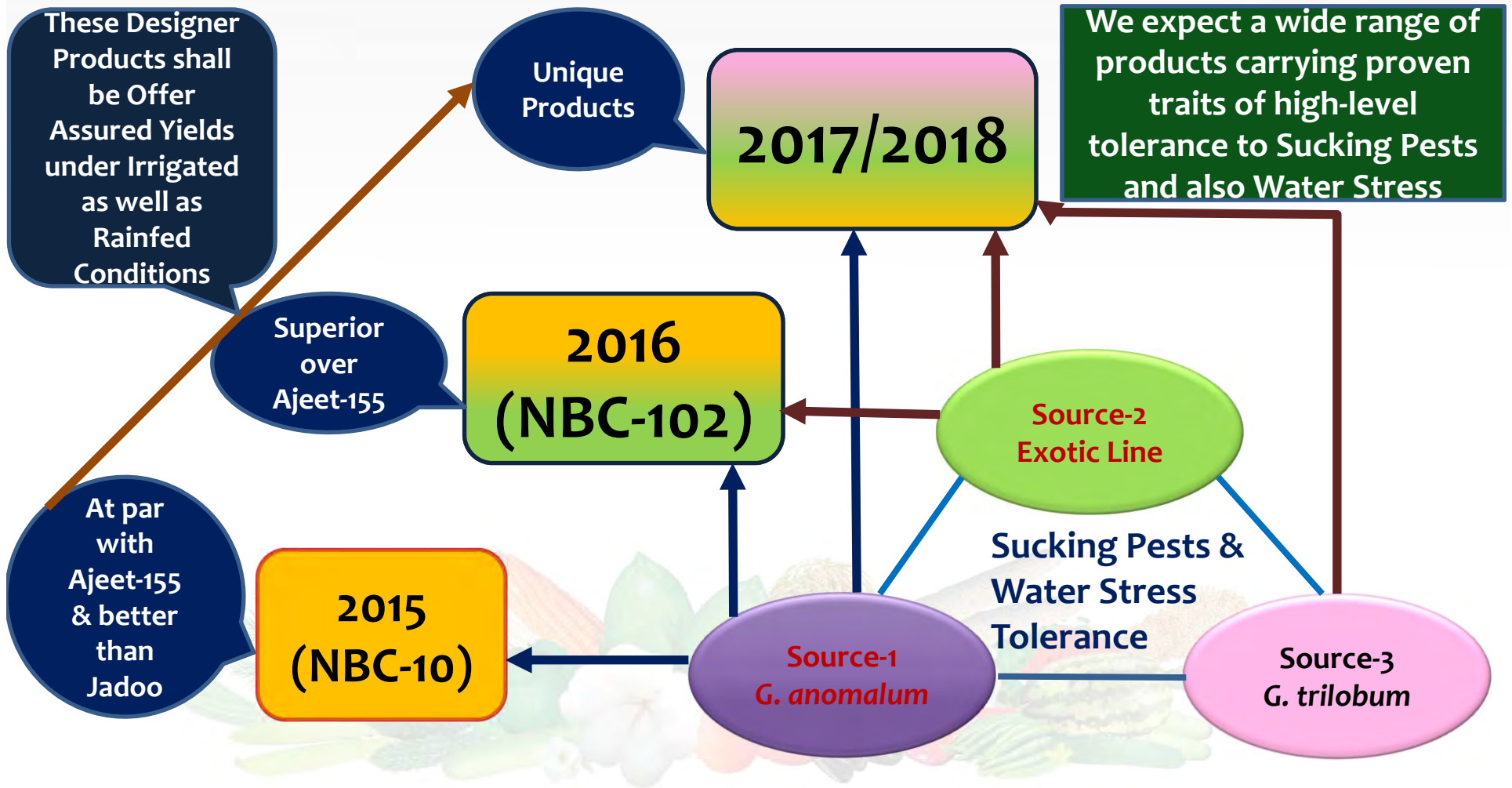
Additional Features

- Medium to Big Bolls with Easy Picking
- Extra-Early Maturity (~140 Days)
- High Volume (*Kapas*) Weight
- GMS Based Hybrid Development
- Attractive Plant Architecture
- Production Friendly
- GOT Friendly

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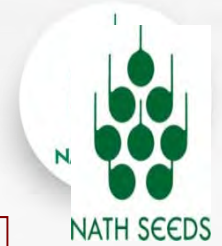
Stacking Proven Sources of High Degree Tolerance to Sucking Pests & Enhanced Tolerance to Water Stress Tolerance in the Genomic Background of Elite Bt-Cotton Hybrids.



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Surgxw#Ghyharsp hqw#Vwkv#534 ; ,



Rainfed

Irrigated

NBC-1811 BGII
First Year ICAR Trials

NBC-1821 BGII
First Year ICAR Trials

NBC-1103
Second Year ICAR
Trials

NBC-1111
Second Year ICAR
Trials

NBC-102

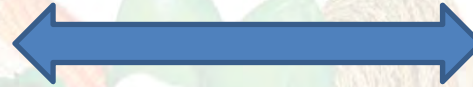
NBC-1022

NBC-10

NBC-101

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Comparative Performance of Bt-Cotton Hybrid, NBC-10 BGII, for Seed Cotton Yield at Six SAU Locations of Telangana & Andhra Pradesh during Kharif-2015

| Hybrid | Seed Cotton Yield (kg/ha) | | | | | | | SCY % Increase Over | | |
|--------------------|---------------------------|--------------|-------------|----------------|-------------|---------------|--------------------|---------------------|------------|--------------|
| | ARS, Adilabad | ARS, Mudhol | RARS, Palem | RARS, Warangal | RARS, Lam | RARS, Nandyal | All Locations Mean | Bunny BGII | Jadoo BGII | Mallika BGII |
| NBC-10 BGII | 3595 | 2823 | 1145 | 2089 | 3201 | 1902 | 2459 | 69 | 24 | 71 |
| Bunny BGII (C) | 2024 | 1629 | 495 | 1490 | 2433 | 661 | 1455 | | | |
| Jadoo BGII (C) | 2539 | 2791 | 736 | 1957 | 2742 | 1092 | 1976 | | | |
| Mallika BGII (C) | 1545 | 1599 | 844 | 1426 | 2514 | 717 | 1441 | | | |
| CD at 5% | 615 | 505.5 | 269 | 250 | 397 | 267 | | | | |
| CV (%) | 17.3 | 14.44 | 16.5 | 9.93 | 9.4 | 14.9 | | | | |

Performance of NBC-10 BGII Cotton Hybrid Under Unprotected Conditions at Regional Agricultural Research Station, Nandyal, AP during Kharif-2015



| S# | Entry Name | Company | Leafhoppers/ 3 leaves | | | Jassids Injury Grade | Locule damage by PBW | Yield (q/ha) |
|----|-------------|------------------------|-----------------------|--------|-------|----------------------|----------------------|--------------|
| | | | 30 DAS | 60 DAS | Mean | | | |
| 1 | NBC 10 | NATH BIO GENES | 10.7 | 4.6 | 7.6 | II | 68.43 | 10.54 |
| 2 | NAMCOT 640 | NAMDHARI SEEDS | 10.89 | 5.78 | 8.33 | II | 72.41 | 9.87 |
| 3 | SWCH 7525 | SEED WORKS IntPvt Ltd | 12.11 | 6.11 | 9.11 | II | 61.92 | 9.15 |
| 4 | RJHH 113 | RJ BIOTECH | 17.67 | 5.66 | 11.67 | III | 53.06 | 9.1 |
| 5 | ANKUR TEJOS | ANKUR SEEDS | 10.78 | 4.89 | 7.83 | II | 73.97 | 8.6 |
| 6 | KCH4011 | KAVERI SEEDS | 16.44 | 6.11 | 11.28 | III | 58.02 | 8.58 |
| 7 | NCS 3456 | NUZIVEEDU SEEDS | 15.78 | 4.11 | 9.95 | II | 73.6 | 8.42 |
| 8 | KCH 4021 | KAVERI SEEDS | 11 | 5.44 | 8.22 | II | 44.34 | 8.08 |
| 9 | DPC 7115 | MONASANTO | 13.44 | 4.44 | 8.94 | II | 64.38 | 7.88 |
| 10 | NCS 6566 | NUZIVEEDU SEEDS | 11.44 | 4.67 | 8.06 | II | 75.44 | 7.81 |
| 11 | BIO AHH383 | SRI RAM BIO SEEDS | 7.55 | 5.55 | 6.55 | I | 70.2 | 7.36 |
| 12 | ANKUR YASH | ANKUR SEEDS | 11.11 | 7.22 | 9.17 | II | 67.57 | 7.35 |
| 13 | ACH 1155-2 | AJEET SEEDS | 11.33 | 4.55 | 7.94 | II | 76.77 | 7.23 |
| 14 | ACH1199-2 | AJEET SEEDS | 11.78 | 5.11 | 8.44 | II | 71.74 | 6.58 |
| 15 | NCS 9999 | NUZIVEEDU SEEDS | 11.89 | 3.78 | 7.83 | II | 66.55 | 6.57 |
| 16 | CCH03 | ROHINI SEEDS | 12.89 | 5 | 8.94 | II | 68.19 | 6.57 |
| 17 | 60 SS66 | SRI SATYA | 16.78 | 5.11 | 10.95 | II | 64.99 | 6.52 |
| 18 | KCH 4001 | KAVERI SEEDS | 18.78 | 5.78 | 12.28 | III | 53.13 | 6.48 |
| 19 | SWCH7677 | SEED WORKS IntPvt Ltd | 11.11 | 6.22 | 8.67 | II | 73.06 | 6.28 |
| 20 | PRCH 135 | PRAVARDHAN SEEDS | 14.45 | 4.44 | 9.45 | II | 51.24 | 6.21 |
| 21 | NBC 101 | NATH BIO GENES | 10.3 | 4.8 | 7.6 | II | 59.17 | 6.18 |
| 22 | JADOO | ROHINI SEEDS | 13.64 | 4.78 | 9.21 | II | 70.28 | 6.05 |
| 23 | KCHH 2725 | KIRTIMAN AGRO GENETICS | 14.11 | 4.89 | 9.5 | II | 79.64 | 5.93 |
| 24 | BIO GHH 029 | SHRIRAM BIO SEEDS | 10.11 | 5.22 | 7.67 | II | 68.34 | 5.82 |
| 25 | DPC 5102 | MONASANTO | 16.67 | 5.45 | 11.06 | III | 73.03 | 5.81 |
| 26 | BIO AHH341 | SHRIRAM BIO SEEDS | 12.78 | 4.33 | 8.55 | II | 54.84 | 5.74 |
| 27 | JAADOO | CHECK | 11.44 | 4 | 7.72 | II | 69.09 | 5.6 |

NBC-10 Ranked FIRST among all test entries (71 entries) from 24 companies, and recorded 88% higher yield over best check hybrid, Jadoo.



Comparative Performance of Bt-Cotton Hybrid, NBC-10 BGII, at RVSKV, Khandwa, Madhya Pradesh during *Kharif*-2016 (Fourth Year Testing)

| Hybrid | 50% SL | No. of Boll/Plant | 10 Boll Wt. (g) | Lint Yield (kg/ha) | Seed Cotton Yield (kg/ha) | % Increase Over RCH-2 | |
|-----------------------|-------------|-------------------|-----------------|--------------------|---------------------------|-----------------------|-------------|
| | | | | | | Lint Yield | SCY |
| NBC-10 BGII | 31.5 | 24.47 | 36.33 | 344.3 | 1179.01 | 44.5 | 46.9 |
| RCH-2 BGII (C) | 24.1 | 18 | 32.33 | 238.33 | 802.47 | | |
| CD at 5% | -- | 3.09 | 2.22 | -- | 186.87 | | |
| CV (%) | -- | 14.58 | 6.11 | -- | 11.82 | | |



Proven Yield Potential:

State Agricultural University Trials (SAUs):

Comparative Performance of Bt-Cotton Hybrid, NBC-102 BGII, for Seed Cotton Yield at Four SAU Locations of Andhra Pradesh during Kharif-2013

| Hybrid | Seed Cotton Yield (kg/ha) | | | | | % Increase over | | |
|---------------------|---------------------------|-------------|----------------|---------------|-------------|-----------------|-----------|-----------|
| | RARS, Lam | ARS, Mudhol | RARS, Warangal | RARS, Nandyal | Mean | Mallika | Bunny | Jadoo |
| NBC-102 BGII | 3267 | 3526 | 2211 | 3547 | 3138 | 27 | 16 | 10 |
| Mallika BGII | 3075 | 2693 | 1732 | 2400 | 2475 | | | |
| Bunny BGII | 3221 | 3078 | 2238 | 2295 | 2708 | | | |
| Jadoo BGII | 2904 | 3080 | 1854 | 3613 | 2863 | | | |
| CD@5% | 626.12 | 409.77 | 408 | 582 | | | | |
| CV% | 11.9 | 8.91 | 12.88 | 12.4 | | | | |

Comparative Performance of NBC-102 BGII in Rainfed Trial for Seed Cotton Yield at UAS, Dharwad, Karnataka during Kharif-2014

| Hybrid | Seed Cotton Yield (kg/ha) | SCY % Increase Over | | |
|----------------|---------------------------|---------------------|------------|-----------|
| | | Bunny | Bunny NBt | DHH-11NBt |
| NBC-102 | 1808 | 101 | 577 | 58 |
| Bunny BGII | 900 | | | |
| Bunny Non-Bt | 267 | | | |
| DHH-11 Non-Bt | 1143 | | | |
| CD at 5% | 374.12 | | | |
| CV (%) | 15.48 | | | |

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Comparative Performance of NBC-102 BGII under Unprotected Rainfed Trial for Seed Cotton Yield at UAS, Dharwad, Karnataka during Kharif-2014

| Hybrid | Seed Cotton Yield (kg/ha) | SCY % Increase Over | | |
|----------------|---------------------------|---------------------|------------|-----------|
| | | Bunny | Bunny NBt | DHH-11NBt |
| NBC-102 | 1476 | 204 | 811 | 74 |
| Bunny BGII | 486 | | | |
| Bunny Non-Bt | 162 | | | |
| DHH-11 Non-Bt | 846 | | | |
| CD at 5% | 502 | | | |
| CV (%) | -- | | | |

Comparative Performance of Bt-Cotton Hybrid, NBC-102 BGII, for Seed Cotton Yield at JAU, Junagadh, Dr. PDKV, Akola and MPKV, Rahuri during Kharif-2014

| Hybrid | Seed Cotton Yield (kg/ha) | | | | SCY % Increase Over | |
|----------------|---------------------------|--------------|---------------|-------------|---------------------|-----------|
| | JAU, Junagadh | MPKV, Rahuri | DrPDKV, Akola | Mean | RCH-2 | Bunny |
| NBC-102 | 1723 | 3790 | 1154 | 2222 | 46 | 44 |
| RCH-2 BGII | 1633 | 2446.6 | 482 | 1521 | | |
| Bunny BGII | 1595 | 2378.9 | 643 | 1539 | | |
| CD at 5% | 304.8 | 605.69 | 152 | | | |
| CV (%) | 11.08 | 12.93 | 10.8 | | | |

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State Agricultural University Trials (SAUs):

Comparative Performance of Bt-Cotton Hybrid, NBC-1022 BGII, for Seed Cotton Yield at Two SAU Locations of Andhra Pradesh during Kharif-2016

| Hybrid | Seed Cotton Yield (kg/ha) | | | SCY % Increase Over | |
|----------------------|---------------------------|-------------|-------------|---------------------|--------------|
| | RARS, Nandyal | RARS, Lam | Mean | Jadoo BGII | RCH-659 BGII |
| NBC-1022 BGII | 3183 | 3428 | 3306 | 28 | 49 |
| Jadoo BGII (C) | 1967 | 3197 | 2582 | | |
| RCH-659 BGII (C) | 1285 | 3162 | 2224 | | |
| CD at 5% | 246 | 434.406 | | | |
| CV (%) | 8.7 | 10.124 | | | |

Comparative Performance of Bt-Cotton Hybrid, NBC-1022 BGII, for Lint Yield at Two SAU Locations of Andhra Pradesh during Kharif-2016

| Hybrid | Lint Yield (kg/ha) | | | Lint Yield % Increase Over | |
|----------------------|--------------------|-------------|-------------|----------------------------|--------------|
| | RARS, Nandyal | RARS, Lam | Mean | Jadoo BGII | RCH-659 BGII |
| NBC-1022 BGII | 1197 | 1140 | 1169 | 29 | 55 |
| Jadoo BGII (C) | 720 | 1093 | 907 | | |
| RCH-659 BGII (C) | 424 | 1088 | 756 | | |
| CD at 5% | -- | 157.628 | | | |
| CV (%) | -- | 10.735 | | | |

Comparative Performance of Bt-Cotton Hybrid, NBC-1022 BGII, at RVSKVV, Khandwa, Madhya Pradesh during Kharif-2016

| Hybrid | 50% SL | No. of Boll/Plant | 10 Boll Wt. (g) | Lint Yield (kg/ha) | Seed Cotton Yield (kg/ha) | % Increase Over RCH-2 | |
|-----------------------|-------------|-------------------|-----------------|--------------------|---------------------------|-----------------------|-------------|
| | | | | | | Lint Yield | SCY |
| NBC-1022 BGII | 34.2 | 34.33 | 35.33 | 461.4 | 1558.64 | 93.6 | 94.2 |
| RCH-2 BGII (C) | 24.1 | 18.00 | 32.33 | 238.33 | 802.47 | | |
| CD at 5% | -- | 3.09 | 2.22 | -- | 186.87 | | |
| CV (%) | -- | 14.58 | 6.11 | -- | 11.82 | | |

Comparative Performance of Bt-Cotton Hybrid, NBC-1022 BGII, under Irrigated Conditions at Three SAU Locations of Maharashtra during Kharif-2016

| Hybrid | Seed Cotton Yield (kg/ha) | | | | SCY % Increase Over | | | | |
|--------------------------|---------------------------|---------------|---------------|-------------|---------------------|--------------|--------------|-----------|-----------|
| | MPKV, Rahuri | CRS, Parbhani | RRC, Amravati | Mean | Bunny | G. Cot. Hy-6 | G. Cot. Hy-8 | Mallika | Phule-492 |
| NBC-1022 BGII | 2583 | 2456 | 2190 | 2410 | 21 | 30 | 29 | 19 | 55 |
| Bunny BGII (C) | 1794 | 1467 | 2719 | 1993 | | | | | |
| G. Cot. Hy-6 (C) | 1801 | 1584 | 2194 | 1860 | | | | | |
| G. Cot. Hy-8 (C) | 1681 | 1485 | 2453 | 1873 | | | | | |
| Mallika BGII (C) | 1828 | 1455 | 2776 | 2020 | | | | | |
| Phule-492 NBt (C) | 1610 | 596 | 2462 | 1556 | | | | | |
| CD at 5% | 464.13 | 369 | 513.39 | | | | | | |
| CV (%) | 11.64 | 11.3 | 12.46 | | | | | | |



Beginning 2017, Genetic Engineering and Appraisal Committee (GEAC), Ministry of Environment, Forests and Climate Change) Entrusted the responsibility of Approving New Bt-Cotton Hybrids to the Department of Agriculture (DAC) and the ICAR. They were directed to ensure greater stringency in the testing system, so as to limit the approval of new hybrid to only the best.

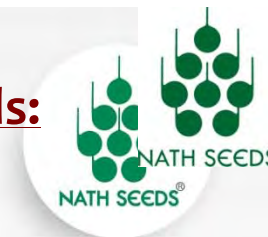
Accordingly, it was decided to constitute an exclusive All India Trialing system under the ICAR, and directly supervised by a select panel of experts of the ICAR. No more than two hybrids are accepted from any organization.

Given the importance of Cotton, some of the leading national and multinational companies participated (*Kharif, 2017*) with their top-line new hybrids.

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Top Three Bt-Cotton Hybrid Performers in All India Coordinated Trials: Kharif-2017



Special Category: Bt-Cotton Hybrids Under Rainfed Cultivation

| S# | Name of the Entry | Company Name | Seed Cotton Yield (q/ha) | Rank | |
|------------------------------|----------------------|--------------------------------|--------------------------|-------------|-------------|
| | | | | CZ: Rainfed | SZ: Rainfed |
| Central Zone: Rainfed | | | | | |
| 1 | NBC-1103 BGII | Nath Bio-Genes (I) Ltd. | 14.61 | 1 | 3 |
| 2 | Ankur Hemang BGII | Ankur Seeds | 14.54 | 2 | 22 |
| 3 | MC 5405 BGII | Metahelix | 13.73 | 3 | 9 |
| South Zone: Rainfed | | | | | |
| 1 | KCH 301 BGII | Kaveri Seed Company Ltd. | 19.11 | 8 | 1 |
| 2 | SP 7670 BGII | Bayer Bio Science | 18.52 | 13 | 2 |
| 3 | NBC-1103 BGII | Nath Bio-Genes (I) Ltd. | 18.2 | 1 | 3 |

Top Three Performers in All India Coordinated Research Project Trials: Kharif-2017



Special Category: Bt-Cotton Hybrids Under Irrigated Cultivation

| S# | Name of the Entry | Company Name | Seed Cotton Yield (q/ha) | Rank | |
|--------------------------------|----------------------|--------------------------------|--------------------------|---------------|---------------|
| | | | | CZ: Irrigated | SZ: Irrigated |
| Central Zone: Irrigated | | | | | |
| 1 | HY.ATCH-605 BGII | Agri Top Seeds Pvt.Ltd. | 23.21 | 1 | NT |
| 2 | PRCH 2799 Bt 2 | Pravardhan Seeds | 21.96 | 2 | NT |
| 3 | NBC-1111 BGII | Nath Bio-Genes (I) Ltd. | 21.82 | 3 | 1 |
| South Zone: Irrigated | | | | | |
| 1 | NBC-1111 BGII | Nath Bio-Genes (I) Ltd. | 20.75 | 1 | 3 |
| 2 | BIO-GHH-104-2 BGII | Shriram Bioseed | 16.86 | NT | 2 |
| 3 | ACH-1155-2 BGII | Ajeet Seeds | 15.74 | NT | 3 |

NT: Not Tested

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None of the company repeated among top three except Nath, which is present in each segment among the top three.



Special Category: Bt-Cotton Hybrids

| S# | Name of the Entry | Company Name | Seed Cotton Yield (q/ha) | Rank | | | |
|--------------------------------|-----------------------|--------------------------------|--------------------------|-------------|---------------|-------------|---------------|
| | | | | CZ: Rainfed | CZ: Irrigated | SZ: Rainfed | SZ: Irrigated |
| Central Zone: Rainfed | | | | | | | |
| 1 | NBC-1103 BGII | Nath Bio-Genes (I) Ltd. | 14.61 | 1 | NT | 3 | NT |
| 2 | Ankur Hemang BGII | Ankur Seeds | 14.54 | 2 | NT | 22 | NT |
| 3 | MC 5405 BGII | Metahelix | 13.73 | 3 | NT | 9 | NT |
| Central Zone: Irrigated | | | | | | | |
| 1 | HY.ATCH-605 BGII | Agri Top Seeds Pvt.Ltd. | 23.21 | NT | 1 | NT | NT |
| 2 | PRCH 2799 Bt 2 | Pravardhan Seeds | 21.96 | 12 | 2 | NT | NT |
| 3 | NBC-1111 BGII | Nath Bio-Genes (I) Ltd. | 21.82 | NT | 3 | NT | 1 |
| South Zone: Rainfed | | | | | | | |
| 1 | KCH 301 BGII | Kaveri Seed Company Ltd. | 19.11 | 8 | NT | 1 | NT |
| 2 | SP 7670 BGII | Bayer Bio Science | 18.52 | 13 | NT | 2 | NT |
| 3 | NBC-1103 BGII | Nath Bio-Genes (I) Ltd. | 18.2 | 1 | NT | 3 | NT |
| South Zone: Irrigated | | | | | | | |
| 1 | NBC-1111 BGII* | Nath Bio-Genes (I) Ltd. | 20.75 | NT | 3 | NT | 1 |
| 2 | BIO-GHH-104-2 BGII* | Shriram Bioseed | 16.86 | NT | NT | NT | 2 |
| 3 | ACH-1155-2 BGII* | Ajeet Seeds | 15.74 | NT | NT | 13 | 3 |

NT: Not Tested

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Performance at ICAR Trials during *Kharif-2017*



Overall Mean Performance In Central Zone during *Kharif-2017: Rainfed*

| S# | Name of the Entry | Company Name | Fibre Length (mm) | Mic | Strength | Seed Cotton Yield (q/ha) | Rank | % Increase Over BGII Zonal Check | % Increase Over BGII Local Check |
|----|-----------------------|--------------------------------------|-------------------|------------|-----------|--------------------------|----------|----------------------------------|----------------------------------|
| 1 | NBC 1103 BGII* | Nath Bio-Genes (I) Ltd. | 29.6 | 4.8 | 30 | 14.61 | 1 | 49.2 | 14.9 |
| 2 | Ankur Hemang BGII* | Ankur Seeds | 28.7 | 4.7 | 29 | 14.54 | 2 | 48.5 | 14.4 |
| 3 | MC 5405 BGII | Metahelix | 27.9 | 4 | 28.6 | 13.73 | 3 | 40.2 | 8 |
| 4 | C 344 BGII | Sungro Seeds Pvt. Ltd. | 29.2 | 4 | 27.8 | 13.72 | 4 | 40.1 | 7.9 |
| 5 | C 9397 BGII | Mahyco | 29.6 | 4.4 | 28.5 | 13.59 | 5 | 38.8 | 6.9 |
| 6 | BIO-GHH 324-2 BGII | Shriram Bioseed | 30.8 | 4.3 | 29 | 13.01 | 6 | 32.9 | 2.4 |
| 7 | BIO-GHH 001-2 BGII | Shriram Bioseed | 30.3 | 4.3 | 30 | 12.95 | 7 | 32.3 | 1.9 |
| 8 | KCH 301 BGII | Kaveri Seed Company Ltd. | 29.4 | 4.5 | 31.3 | 12.85 | 8 | 31.3 | 1.1 |
| 9 | INDAM 1667 BGII | Indo-American Hybrid Seeds (I) Pvt L | 29.2 | 4.1 | 29 | 12.77 | 9 | 30.4 | 0.5 |
| 10 | RCH 929 BGII | Rasi Seeds | 30.3 | 4 | 30.9 | 12.71 | 10 | 29.8 | 0 |
| 11 | BGII Local Check | Check | 29.9 | 4.2 | 28.7 | 12.71 | 11 | 29.8 | 0 |
| 12 | PRCH 2799 Bt 2 | Pravardhan Seeds | 29.8 | 4.2 | 28.3 | 12.48 | 12 | 27.5 | -1.8 |
| 13 | SP 7670 BGII | Bayer Bio Science | 29.3 | 3.9 | 28 | 12.37 | 13 | 26.4 | -2.7 |
| 14 | YCH 7475 Bt 2 | Yaaganti Seeds Pvt.Ltd. | 29.3 | 4.5 | 30.7 | 12.21 | 14 | 24.7 | -3.9 |
| 15 | SWCH 8263 BGII | Seed Works | 29.7 | 4.1 | 29.2 | 12.08 | 15 | 23.4 | -5 |
| 16 | NCS 7691 Bt 2 | Nuziveedu Seeds Pvt. Ltd. | 30.7 | 4 | 30 | 11.83 | 16 | 20.8 | -6.9 |
| 17 | C 331 BGII | Sungro Seeds Pvt. Ltd. | 29.1 | 4.2 | 31.8 | 11.74 | 17 | 19.9 | -7.6 |
| 18 | C 9391 BGII | Mahyco | 28.1 | 4.1 | 30.8 | 11.49 | 18 | 17.4 | -9.6 |
| 19 | ACH-171-2 BGII | Ajeet Seeds | 30.4 | 4.1 | 30.1 | 11.29 | 19 | 15.3 | -11.2 |
| 20 | ACH-121-2 BGII | Ajeet Seeds | 32.3 | 3.2 | 30.4 | 10.97 | 20 | 12.1 | -13.7 |
| 21 | Neo 1635 BGII | Neo Seeds India Pvt Ltd | 30.7 | 4.9 | 29.6 | 10.68 | 21 | 9.1 | -16 |
| 22 | PCH 5677 Bt 2 | Prabhat Agri Biotech | 30.1 | 3.8 | 29.9 | 10.22 | 22 | 4.4 | -19.6 |
| 23 | Daftari 333 | Daftari Agro Pvt. Ltd. | 32.2 | 4 | 31.9 | 10.06 | 23 | 2.8 | -20.8 |
| 24 | Neo 1655 BGII | Neo Seeds India Pvt Ltd | 30.2 | 4.3 | 30.8 | 9.88 | 24 | 0.9 | -22.3 |
| 25 | Bunny BGII | Check | 32.3 | 3.6 | 29.5 | 9.79 | 25 | 0 | -23 |
| 26 | Daftari 525 | Daftari Agro Pvt. Ltd. | 32.9 | 3.6 | 30.1 | 8.52 | 26 | -13 | -33 |
| 27 | Bunny (NBt) | Check | 30.2 | 4.1 | 30.4 | 7.76 | 27 | -20.7 | -38.9 |
| 28 | Non Bt Local Check | Check | 29.8 | 4.6 | 29.4 | 7.23 | 28 | -26.1 | -43.1 |

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Performance at ICAR Trials during *Kharif-2017*



Overall Mean Performance In South Zone during *Kharif-2017: Irrigated*

| S# | Name of the Entry | Company Name | Fibre Length (mm) | Mic | Strength | Seed Cotton Yield (q/ha) | Rank | % Increase Over BGII Zonal Check | % Increase Over BGII Local Check |
|----|---------------------|------------------------------------|-------------------|-----|----------|--------------------------|------|----------------------------------|----------------------------------|
| 1 | NBC 1111 BGII* | Nath Bio-Genes (I) Ltd. | 28.1 | 4.2 | 28.8 | 20.75 | 1 | 53 | 44 |
| 2 | BIO-GHH-104-2 BGII* | Shriram Bioseed | 29.4 | 3.8 | 29.3 | 16.86 | 2 | 25 | 17 |
| 3 | ACH-1155-2 BGII* | Ajeet Seeds | 28.7 | 4.2 | 28.8 | 15.74 | 3 | 16 | 10 |
| 4 | SRCH-207 BGII | Sri Rama Agri Genetics (I) Pvt.Ltd | 27.5 | 3.3 | 27.5 | 14.74 | 4 | 9 | 3 |
| 5 | Ankur Samir BGII | Ankur Seeds | 26.8 | 4.3 | 27.7 | 14.65 | 5 | 8 | 2 |
| 6 | SP 7669 BGII | Bayer Bio Science | 29.1 | 3.7 | 29.5 | 14.45 | 6 | 7 | 1 |
| 7 | BGII Local Check | Check | 29.2 | 3.6 | 29.5 | 14.37 | 7 | 6 | 0 |
| 8 | JKCH 15551 BGII | JK Agri Genetics | 28.3 | 3.7 | 27.3 | 14.35 | 8 | 6 | 0 |
| 9 | C 9366 BGII | Mahyco | 27.4 | 3.8 | 29.4 | 13.66 | 9 | 1 | -5 |
| 10 | C 9355 BGII | Mahyco | 29.4 | 3.9 | 28.2 | 13.6 | 10 | 1 | -5 |
| 11 | Bunny BGII | Check | 31.7 | 3.4 | 28.8 | 13.53 | 11 | 0 | -6 |
| 12 | C 375 BGII | Sungro Seeds Pvt. Ltd. | 29.5 | 3.8 | 28.7 | 13.31 | 12 | -2 | -7 |
| 13 | RCH 933 BGII | Rasi Seeds | 29.3 | 3.2 | 29.6 | 13.23 | 13 | -2 | -8 |
| 14 | SRCH-153 BGII | Sri Rama Agri Genetics (I) Pvt.Ltd | 29.2 | 3.5 | 29.2 | 13.11 | 14 | -3 | -9 |
| 15 | KCH 302 BGII | Kaveri Seed Company Ltd. | 28.4 | 3.5 | 29.6 | 13.06 | 15 | -3 | -9 |
| 16 | C 377 BGII | Sungro Seeds Pvt. Ltd. | 27.6 | 3.8 | 29.3 | 12.97 | 16 | -4 | -10 |
| 17 | ACH-1199-2 BGII | Ajeet Seeds | 29.4 | 3.3 | 30.4 | 12.66 | 17 | -6 | -12 |
| 18 | Bunny (NBt) | Check | 29.9 | 3.5 | 29.2 | 10.33 | 18 | -24 | -28 |

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GMS for High Density Planting and Machine Picking

GMS Based Hybrid Seed Production- Benefits



P1

X

P2

F1

Production Cost Reduced ~25%

No need for emasculation during hybrid seed production

Quality Assurance for F1 Seed

Chances of self plants are negligible.

Better Suitability Under HDP

Large quantity seed production is feasible through GMS

Easy for GOT

No confusion for GOT observations; no mistakes

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We have already an exclusive Bt-Cotton GMS Hybrid Cotton Development Program in Progress.

**First GMS Hybrid MLT was done last year (2017).
Selected hybrids are currently under Large Scale Trials
in Maharashtra**



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PBW Awareness Campaign at NBIL's R&D Farm



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Creating a Brighter Future for the Indian Farmers



Generating a New Range of Transgenic Bt-Cotton Events



Nath Bio-Genes (I) Ltd

Nath House, Nath Road, Aurangabad 431005 Tel.: 0240 2376314-17
Fax: 0240 2376188 www.nathbiogenes.com

Modifications of *cry* genes to Enhance Their Efficacy Against Cotton Bollworms



Mod1: Substitution of amino acid at N-terminal side of the protein which improves toxin binding efficiency

- On the basis of Insilco analysis, it was understood that short span of the N-terminal Trans Membrane segment of the *Cry2Aa* molecule may contribute towards its low toxicity.
- Replacing the one amino acid (at 72 position) increases the Trans Membrane region.

Cry2Aa Amino Acid Sequences

Trans membrane region

MNNVLNSGRTTICDAYNVVAHDPFSFEHKSLDTIQKEWMEWKRTDHSLYVAPVVGTVSSFLKKVGSLLIGKRILSELWGIIFPSGSTNLMQDI
 LRETEQFLNQRLNTDTLARVNAELIGLQANIREFNQQVDNFLNPTQNPVPLSITSSVNTMQQLFLNRLPQFQIQGYQLLLLPLFAQAANMHL
 SFIRDVILNADEWGISAATLRTYRDYLRNYTRDYSNYCINTYQTAFRGLNTRLHDMLEFRTYMFLNVFEYVSIWLSLFKYQSLMVSSGANLYASG
 SGPQQTQSFTAQNWPFLYSLFQVNSNYILSGISGTRLSITFPNIGGLPGSTTTHSLNSARVNYSGGVSSGLIGATNLNHNFCSTVLPPLSTPFV
 RSWLDSGTDREGVATSTNWQTESFQTTLSLRGAFSARGNSNYFPDYFIRNISGVPLVIRNEDLTRPLHYNQIRNIESPSGTPGGARAYLVS
 NRKNNIYAANENGTMIHLAPEDYTGFTISPIHATQVNNQTRTFISEKFGNQGDSLRFEQSNTTARYTLRGNGNSYNLYLRVSSIGNSTIRVTIN
 GRVYTVSNVNTTTNNDGVNDNGARFSDINIGNIVASDNTNVTLDINVTLNSGTPFDLMNIMFVPTNLPPPLY

Potential trans membrane segments before modification

| Start | Stop | Length | ~ | Cut-off |
|-------|------|--------|---|---------|
| 51 | 62 | 12 | ~ | 1.7 |

Potential trans membrane segments after modification

| Start | Stop | Length | ~ | Cut-off |
|-------|------|--------|---|---------|
| 51 | 72 | 22 | ~ | 2.7 |

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GENETIC MARKERS



"The green section indicates the presence of a desirable gene in an organisms' genetic code that is associated with two genetic markers (red flags)."

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ToLCV Resistant Genes Present in Our Hybrids and the Competitors' Leading Hybrids

| S# | Competitor | Ty1 | Ty2 | Ty3 |
|----|-------------------------------|-----|-----|----------|
| 1 | ABHINAV (Syngenta) | H | - | - |
| 2 | TO-1389 (Syngenta) | H | - | H |
| 3 | NS-501 (Namdhari) | - | H | - |
| 4 | US-3383 (US Agri.) | - | H | - |
| 5 | NS-585 (Namdhari) | H | - | H (Ty3a) |
| 6 | LAKSHMI (Nunhems) | - | H | - |
| 7 | NS-592 (Namdhari) | - | H | H |
| 8 | Heemshikhar (Syngenta) | H | - | H |
| 9 | Abhilash (Seminis) | H | - | H |
| 10 | Ayushman (Seminis) | H | - | - |
| 11 | NTH-1831 (Nath Seeds) | H | H | H |
| 12 | NTH-1894 (Nath Seeds) | H | H | H |

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Source: Bhanupratap, Tomato Breeder, NBIL
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Molecular Markers Available for other Disease Resistant Traits/Genes

| S.No | Trait | Gene | Marker | Chromosome |
|------|---------------------------|----------|----------------|------------|
| 1 | Late blight resistance | Ph-2 and | dTG422-CAPS | 10 |
| | | Ph-3 | TG328-CAPS | 9 |
| 2 | Bacterial wilt resistance | Bwr-12 | SLM12-2-SCAR | 6 |
| | | | SLM12-10 | 12 |
| 3 | Fusarium wilt resistance | I2 | I2OH-SCAR | 11 |
| 4 | Root-knot nematode | Mi | CAPS | 6 |
| 5 | Spotted wilt virus | Sw-5 | SNP-Gene Based | 9 |



Plans for the Future:

- *Ty5* to be critically examined for its efficacy and, if providing added advantage, the gene shall be accordingly mobilized (through MAS) to region/segment-specific hybrids of choice.
- TOSPO would be a major target.
Tomato Breeding Program already have good resistant sources, but they need further validation. Accordingly then, molecular markers shall be identified, which would be entirely our own effort.
- Late Blight and Early Blight
- Bacterial Wilt

B. Marker Assisted Breeding in Rice

We have established reproducible screening protocols for Blast, BLB and Submergence tolerance of rice which, used in Marker Assisted Breeding programs. We are also screening all foreign parental lines for the presence of Blast and BLB resistant markers .



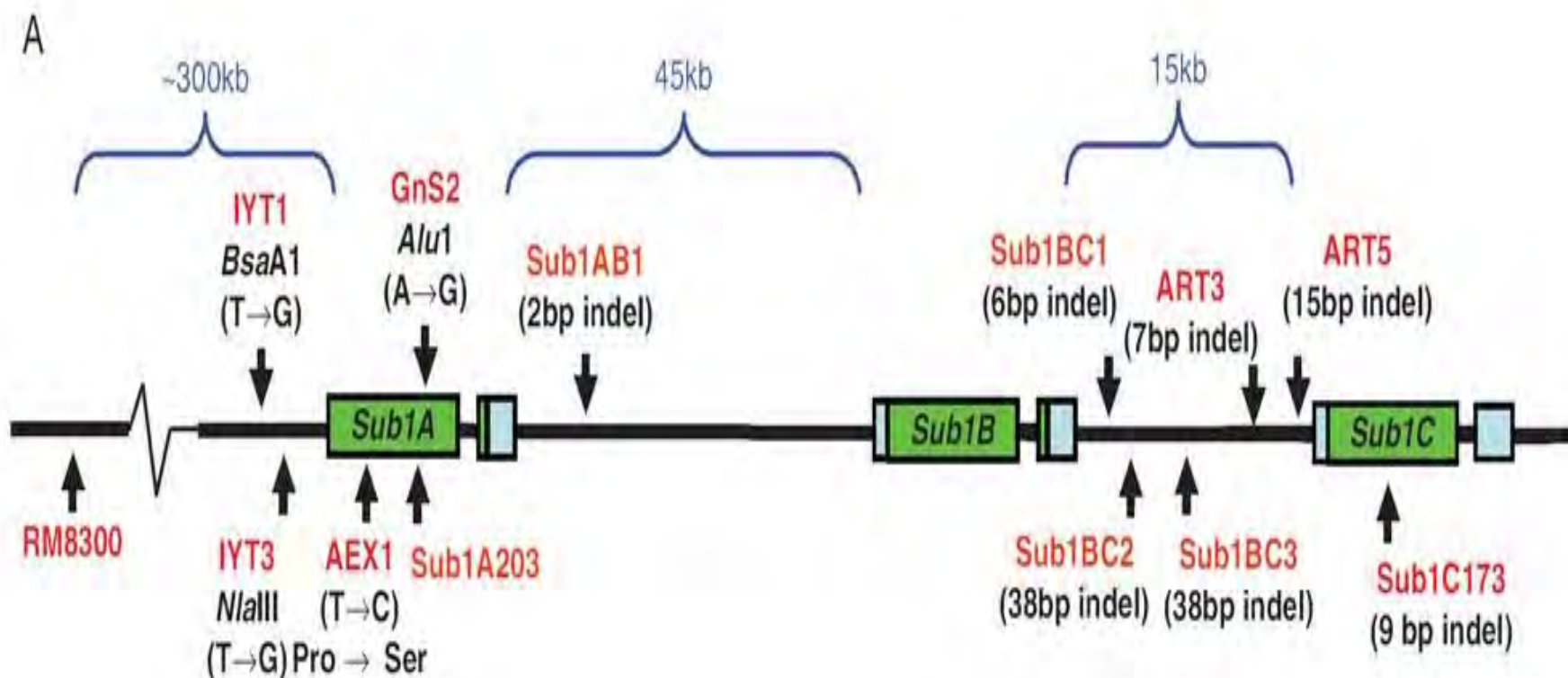
| Trait | Causative Organism | Gene(s)/QTL(s) | Linked Marker |
|-----------------------------|---------------------------|----------------|---|
| Blast Resistance | <i>Magnaporthe grisea</i> | Pi-z | Z56592 |
| | | Piz-t | Zt56591 |
| | | Pik-p | K3957 |
| | | Pik-h | Candidate gene marker, RM206 |
| | | Pi-b | Pb28 |
| | | Pi-9 | 195R-1 |
| | | Pi-ta/Pi-ta2 | YL155/YL87,RM541 |
| | | Pi-1 | RM224 |
| Bacterial Blight Resistance | <i>Xanthomonas oryzae</i> | Xa4 | STS-M1 |
| | | Xa5 | RG556+DraI |
| | | Xa7 | STS-M5 |
| | | Xa10 | Gene linked RFLP |
| | | Xa13 | RG136+HinfI |
| | | Xa21 | STS (pTA248) |
| | | Xa27 | STS-M124 |
| Submergence Tolerance | | Sub1A Sub1C | IYT1-CAP marker, AEX Sub1C173, ART3, ART5. |

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Molecular markers developed in the *Sub1* gene cluster



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Rice breeding material tested for Bacterial blight tolerant genes/traits



| Year | Gene/Trait | Number of samples |
|------|-------------|-------------------|
| 2014 | <i>Xa4</i> | 340 |
| | <i>Xa5</i> | 340 |
| | <i>Xa7</i> | 340 |
| | <i>Xa13</i> | 340 |
| | <i>Xa21</i> | 340 |
| 2016 | <i>Xa4</i> | 182 |
| | <i>Xa5</i> | 182 |
| | <i>Xa7</i> | 182 |
| | <i>Xa13</i> | 182 |
| | <i>Xa21</i> | 182 |
| 2017 | <i>Xa5</i> | 24 |
| | <i>Xa13</i> | 24 |
| | <i>Xa21</i> | 24 |

Rice breeding material tested for Submergence tolerant genes/traits

| Year | Gene/Trait | Number of samples |
|------|-------------|-------------------|
| 2016 | <i>Sub1</i> | 50 |

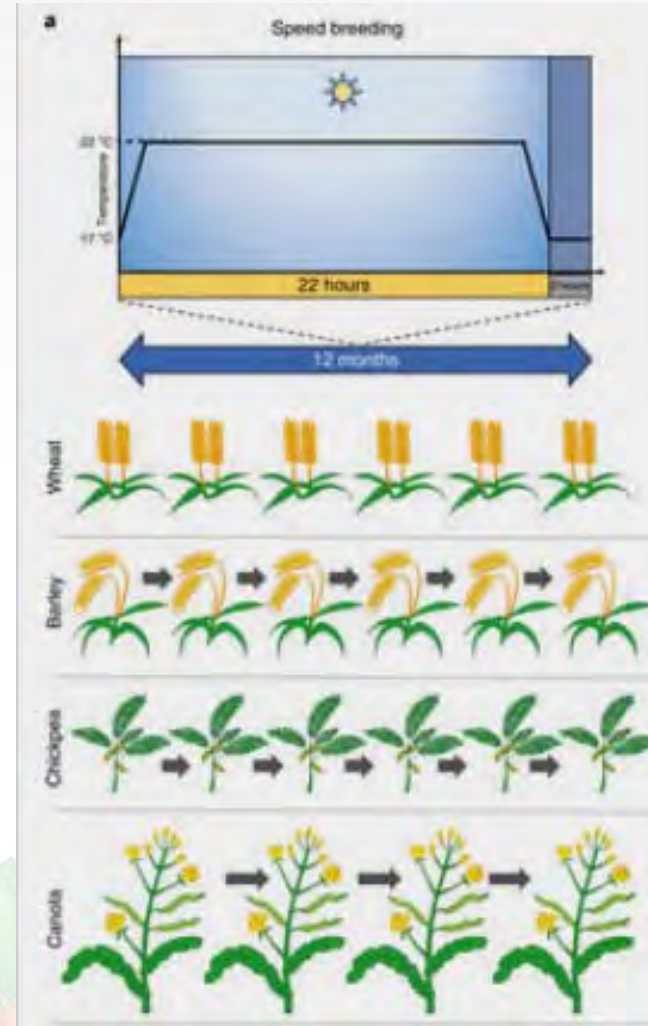
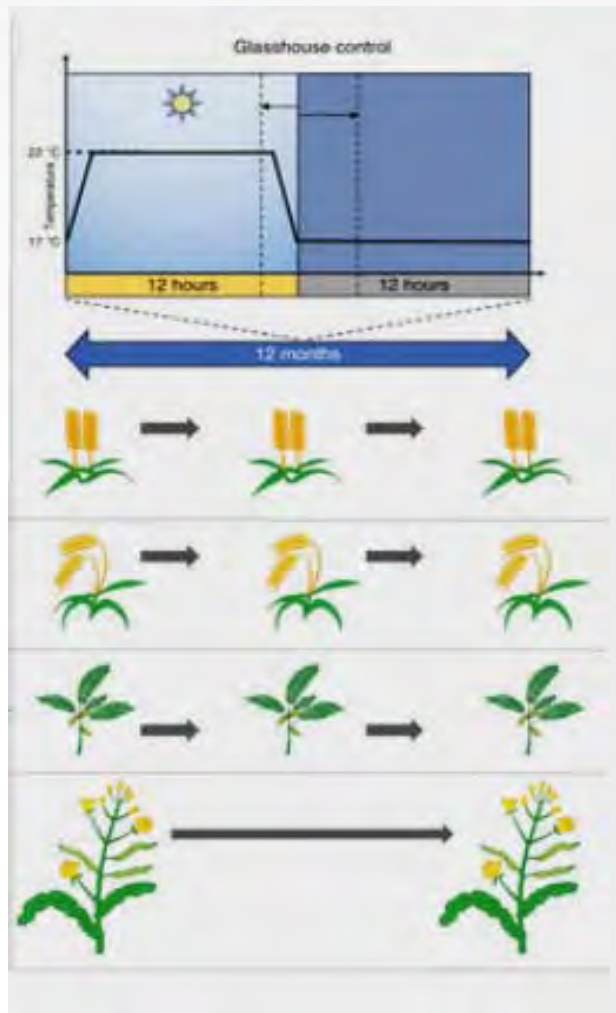
Rice hybridity test

| Year | hybrid | Number of samples |
|------|-------------|-------------------|
| 2017 | Ghazab | 1100 |
| | Super-Duper | 200 |

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Speed breeding accelerates generation time of major crop plants for research and breeding



in a glasshouse with a natural variable photoperiod (10–16 hours), where 1–2 generations of wheat, barley, chickpea and canola can be achieved per year (left).

of relatively rapid cycling cultivars

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Ongoing RNAi Projects

RNAi Based Insect Resistant Cotton

- Pink Bollworm has already become resistant to Bt-cotton events currently available in India, it may be a matter of some time before the notorious American Bollworm (*Helicoverpa armigera*) also develops resistance against current Bt-cotton events in our country.
- With the progression of RNAi research, an alternative tool for



- ***HR3* gene in target insects, including Pink Bollworm, plays key role during the metamorphosis of molting.**
- **If this process can be inhibited by a mutation or silencing of *HR3*, the target insects cannot progress towards completion of life cycle. Consequently, the moth population will be reduced significantly.**
- **A recent publication (Silencing the HaHR3 Gene by Transgenic Plant-**



Bt-biopesticide and Identification and Isolation of New Bt-genes (Ongoing)

- Aside from editing the existing Bt-genes to enhance efficacy against target pests, we have also initiated project to identify new Bt-genes mainly against pink bollworm.
- The main aim of this work also includes possible development of efficient bio-pesticide by combining multiple Bt-strains to target mainly *Helicoverpa armigera*, *Pectinophora*

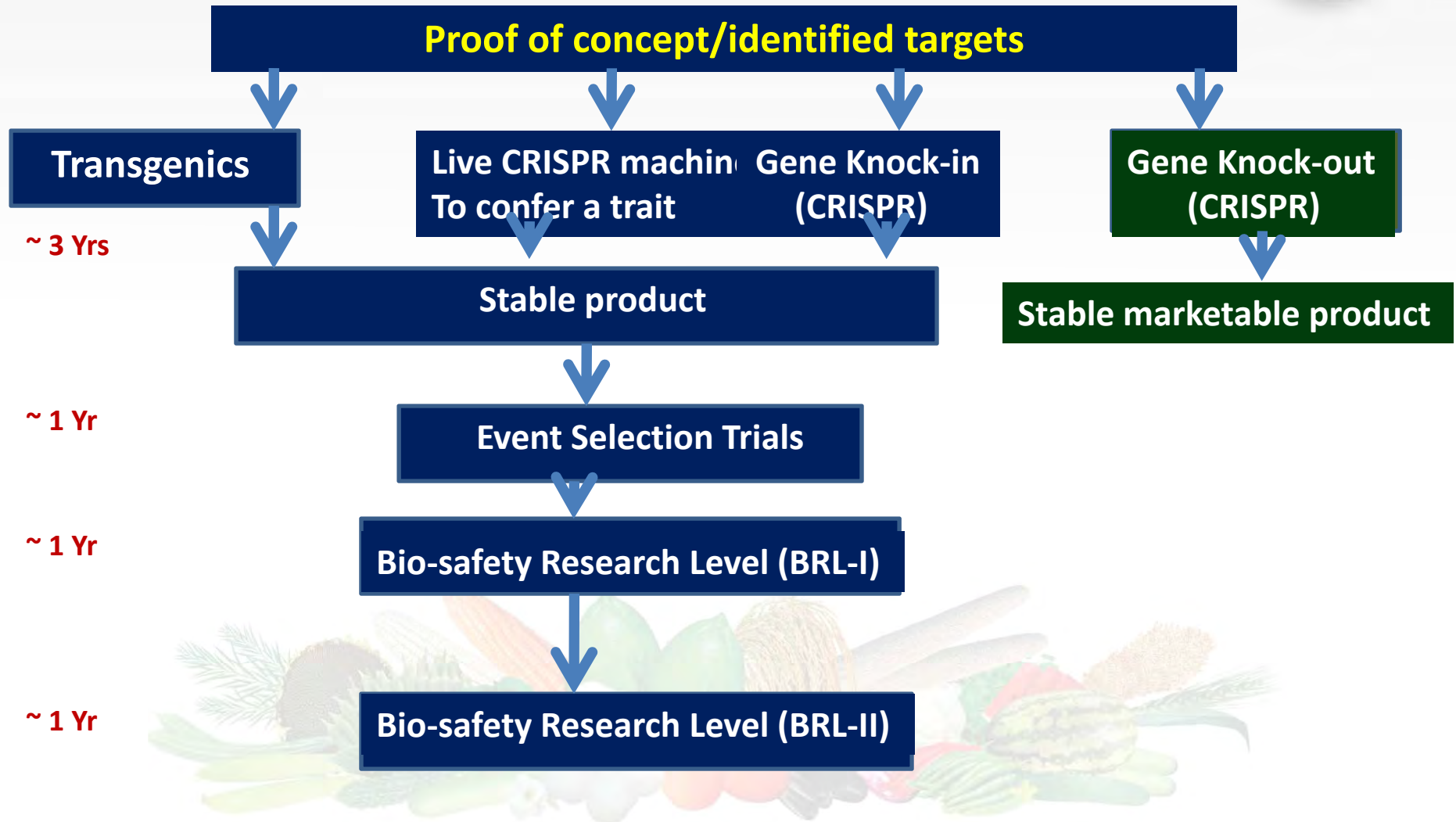


CRISPR

Precise Genome Editing Technology

Clustered Regularly Interspaced Short Palindromic Repeats

Transgenics Vs Genome Editing (CRISPR)



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Ongoing Gene Editing Projects

1. Broad-spectrum virus tolerant plants
Targeted crops: Tomato (Toospo Virus)

Methodology: CRISPR-Cas9 based gene knock-out

Proof of Concept:



MOLECULAR PLANT PATHOLOGY (2016) 17(7), 1140–1153

DOI: 10.1111/mpp.12375

Development of broad virus resistance in non-transgenic cucumber using CRISPR/Cas9 technology

JEYABHARATHY CHANDRASEKARAN^{1,†}, MARINA BRUMIN^{1,†}, DALIA WOLF^{2,†}, DIANA LEIBMAN¹, CHEN KLAP¹, MALI PEARLSMAN¹, AMIR SHERMAN³, TZAHI ARAZI⁴ AND AMIT GAL-ON^{1,*}

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Mode of Action

- Many plant viruses require host factors to complete their life cycle.
- One of such host factor is eukaryotic translation initiation factor (eIF4E).
- eIF4E is any essential host factor for translation viral proteins.
- Inhibition or silencing of eIF4E in host plants will prevent virus multiplication.
- This approach already demonstrated in Cucumber and Arabidopsis to confer broad spectrum viral tolerance traits.
- We are using similar approach to knock down eIF4E of tomato to confer broad spectrum viral tolerance.



2. Control of root system architecture by DEEPER ROOTING 1 increases rice yield under drought conditions

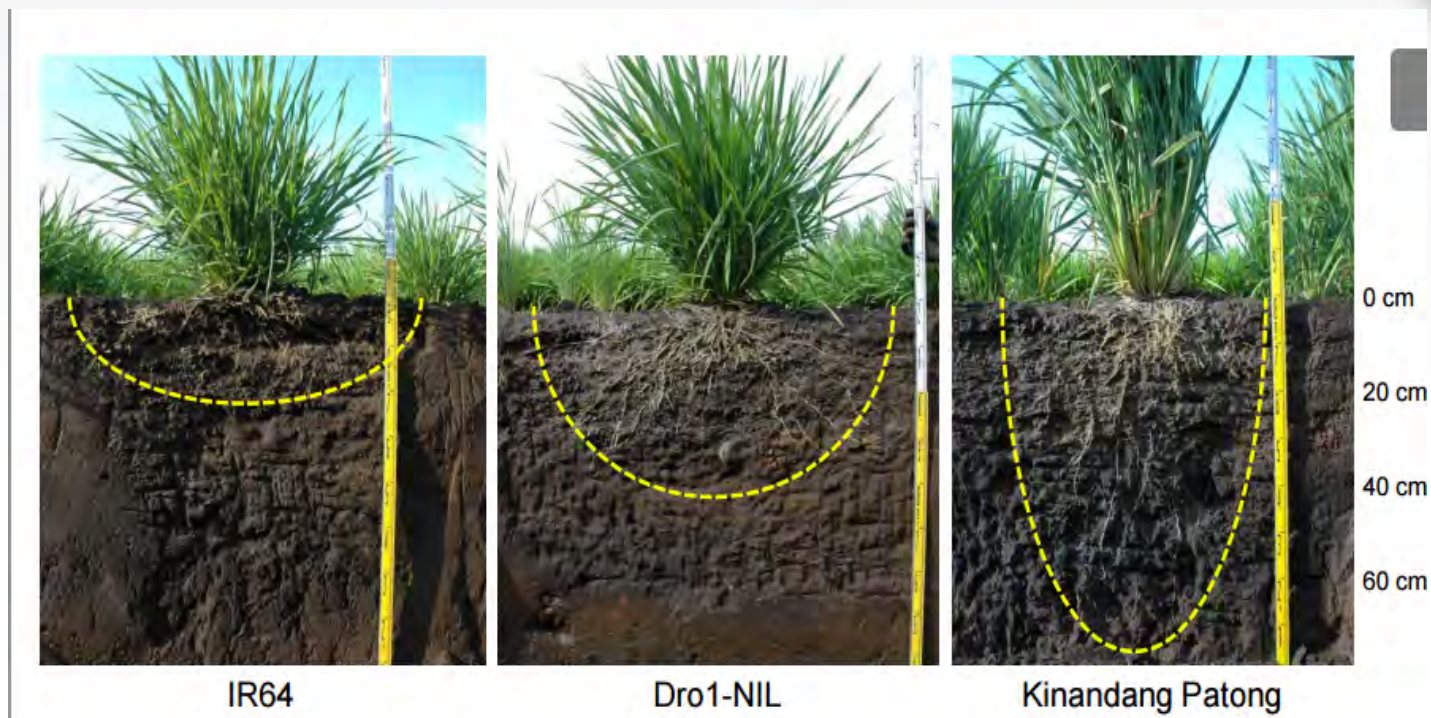
([Nat Genet. 2013 Sep;45\(9\):1097-102. doi: 10.1038/ng.2725. Epub 2013 Aug 4](#))

- ❑ Methodology: CRISPR-cas9
- ❑ The genetic improvement of drought resistance is essential for stable and adequate crop production in drought-prone areas.
- ❑ Alteration of root system architecture improves drought avoidance through the cloning and characterization of DEEPER ROOTING 1 (DRO1), a rice quantitative trait locus controlling root growth angle.
- ❑ Higher expression of DRO1 increases the root growth angle, whereby roots grow in a more downward direction.
- ❑ Introducing DRO1 into a shallow-rooting rice cultivar by backcrossing enabled the resulting line to avoid drought by increasing deep rooting, which maintained high yield performance under drought conditions relative to the recipient cultivar.



Drought Tolerance experiments with IR64 and (Functional Dro-1 transgenic of IR64) plants.

- ❖ Under severe drought, physiological damage such as leaf wilting and delayed flowering was more prominent in IR64 than in Dro1-NIL (Functional Dro-1 transgenic) plants.
- ❖ Moderate drought significantly reduced the grain weight per plant in IR64 plants (to 42.3% of that in unstressed plants), whereas Dro1-NIL plants had almost the same grain



Supplementary Figure 1. Representative vertical root distribution of IR64, Dro1-NIL, and Kinandang Patong in an upland field.
Root distribution was assessed by using the trench method. Yellow dashed lines indicate the extent of root elongation.



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The two products, **Ghazab** and **Super Duper**, meet the two very important requirements/criteria of Hybrid Rice today:

Very high heterotic hybrids, of very high yield potential, and Early maturity : 110-115 days (Super Duper), 120 days (Ghazab). Both non-lodging.

These two credentials assume great importance today, in view of the uncertainties of rain and, therefore, sooner we can harvest the better. Harvesting yields of 130-140 day maturity products, 2-3 weeks sooner, is a Huge Plus for the farmers.

Besides, **Ghazab** has *ghazab*-like cluster panicles, grains 275-325 per panicle, more than 90% fertile spikelets, Long medium-bold grains, excellent synchronous maturity (all tillers mature within 5-6 days, so farmers do not have to wait for late-tertiary tillers to mature, before he can harvest), height just about 95-100 cm. Yields (according to Pathak Ji): 34-36 q per acre.

However, Ghazab is primarily a Dry Season product, not bred/developed for Wet Season.

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In our case, **Ghazab** can be a Very Dominating Product, in Jarkhand,



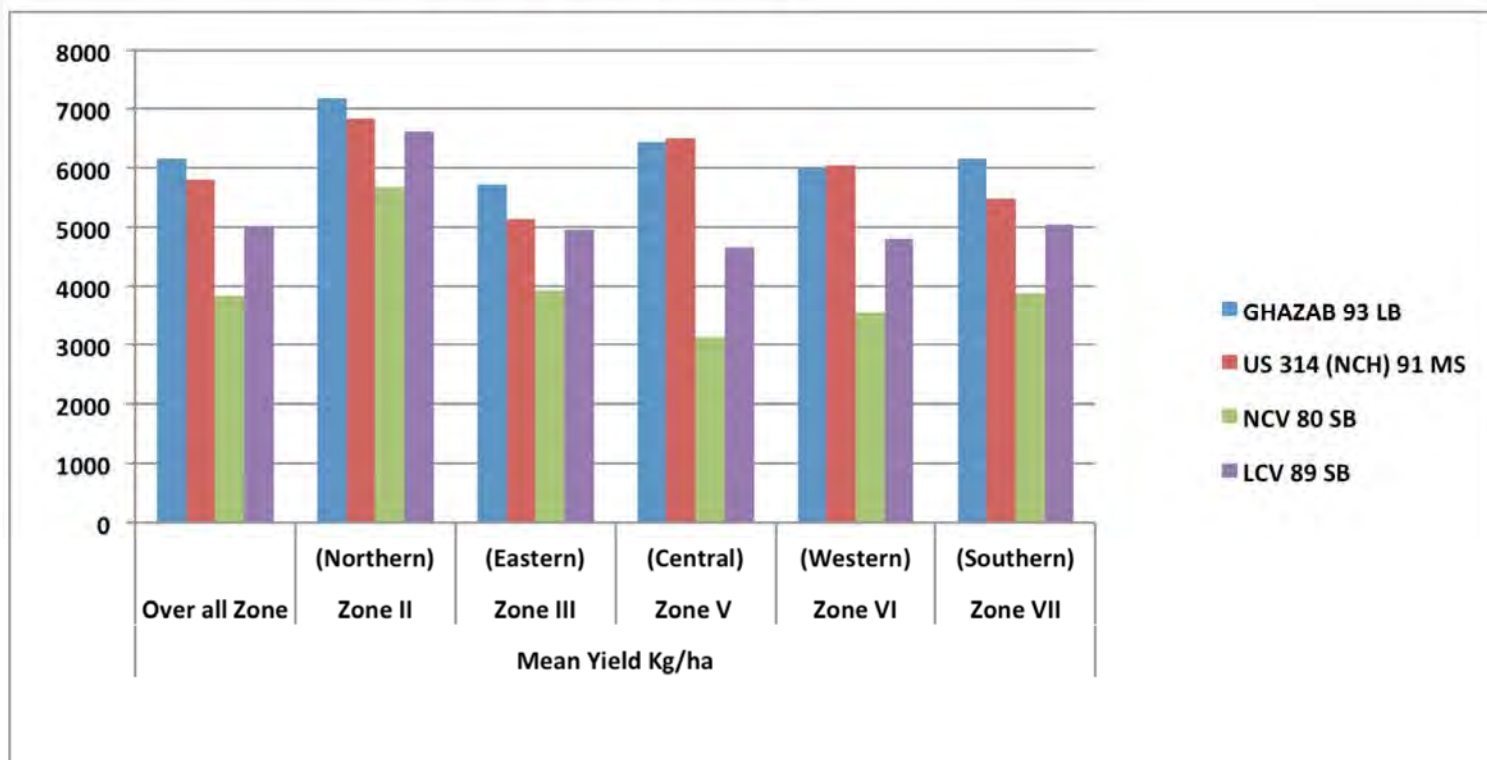
Super Duper matures in just about 115 days (± 5 Days): Superb. 110-115 cm Height, Non-Lodging, Almost 100% spikelet fertility. According to Pathak Ji, yields 24-26 q per acre.

However, Seeds are Long Bold. Suitable mainly in Boro areas. Whereas in the State of Orrisa (Odisha), the hybrid can be taken up round the year, Kharif as well as Rabi/Boro, in the states West Bengal, Jarkhand, MP and Assam, it would be typically a Boro product. Pathak Ji says he has very good reports from Assam for Boro. Early maturity and high yield are the most desirable features.

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Paddy Hybrid GHAZAB Yield (Kg/ha) Compared to Checks [ICAR TRIAL]



| S# | HYBRID | DFF | Grain Type | Mean Yield Kg/ha | | | | | |
|--|------------|-----|------------|------------------|------------|-----------|-----------|-----------|------------|
| | | | | Over all Zone | Zone II | Zone III | Zone V | Zone VI | Zone VII |
| | | | | | (Northern) | (Eastern) | (Central) | (Western) | (Southern) |
| 1 | GHAZAB | 93 | LB | 6147 | 7165 | 5725 | 6442 | 5989 | 6147 |
| 2 | US314(NCH) | 91 | MS | 5803 | 6829 | 5119 | 6496 | 6046 | 5479 |
| 3 | NCV | 80 | SB | 3845 | 5664 | 3941 | 3133 | 3548 | 3886 |
| 4 | LCV | 89 | SB | 5028 | 6610 | 4957 | 4661 | 4792 | 5052 |
| NCH=National hybrid check (US 314), NCV= National varietal check (Anjali), LCV= Local check Variety. | | | | | | | | | |
| DFF= Day's to 50% Flowering | | | | | | | | | |



Thank You



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Vegetable Crops

- C. S. Pathak



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Vegetable crop - Fundamentals

- Vegetable seed Industry is > Rs 2500 crore and increasing
- The crops we are working have market potential of **> Rs 1250 crores**
- Plans to achieve 10% market share by 2021



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Vegetable crops - Fundamentals

- **Increasing importance**
 - Huge domestic consumption for fresh & in future processed products
 - Enhanced purchasing power of large population
 - Increased Health consciousness
 - Export potential for fresh & processed products
 - Predominant short duration cash crops
- **Performance of the variety - a key driver**
 - Yield, pest & disease tolerance & input and output traits
 - End consumer & farmers are looking for value and willing to pay for value added products



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Our focus on Vegetables

- Work only on few but important crops:
 - Tomato
 - Okra
 - Chilli
 - Brinjal
 - Gourds
 - Cucumber
- Develop superior products and get leadership position in mandated crops
- Linkages with leading Institutes in India and abroad involved in Vegetable Research to support our research activities
- Use the best technologies available
- Keep awareness about Market dynamics
- Smart working
 - Knowing our markets
 - Understanding of cropping Seasons
 - Biotic and abiotic stresses and their management
 - Crop agronomy – new ways
 - Use of new technologies

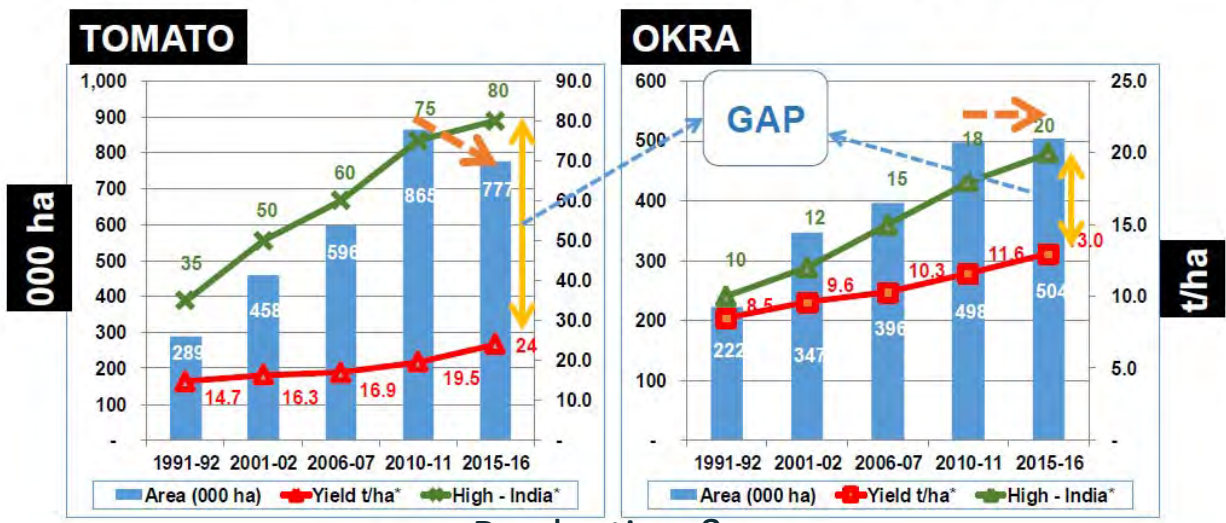
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Production & Productivity in Tomato & Okra – 1991- 2016

Production & Productivity in Tomato & Okra – 1991_2016

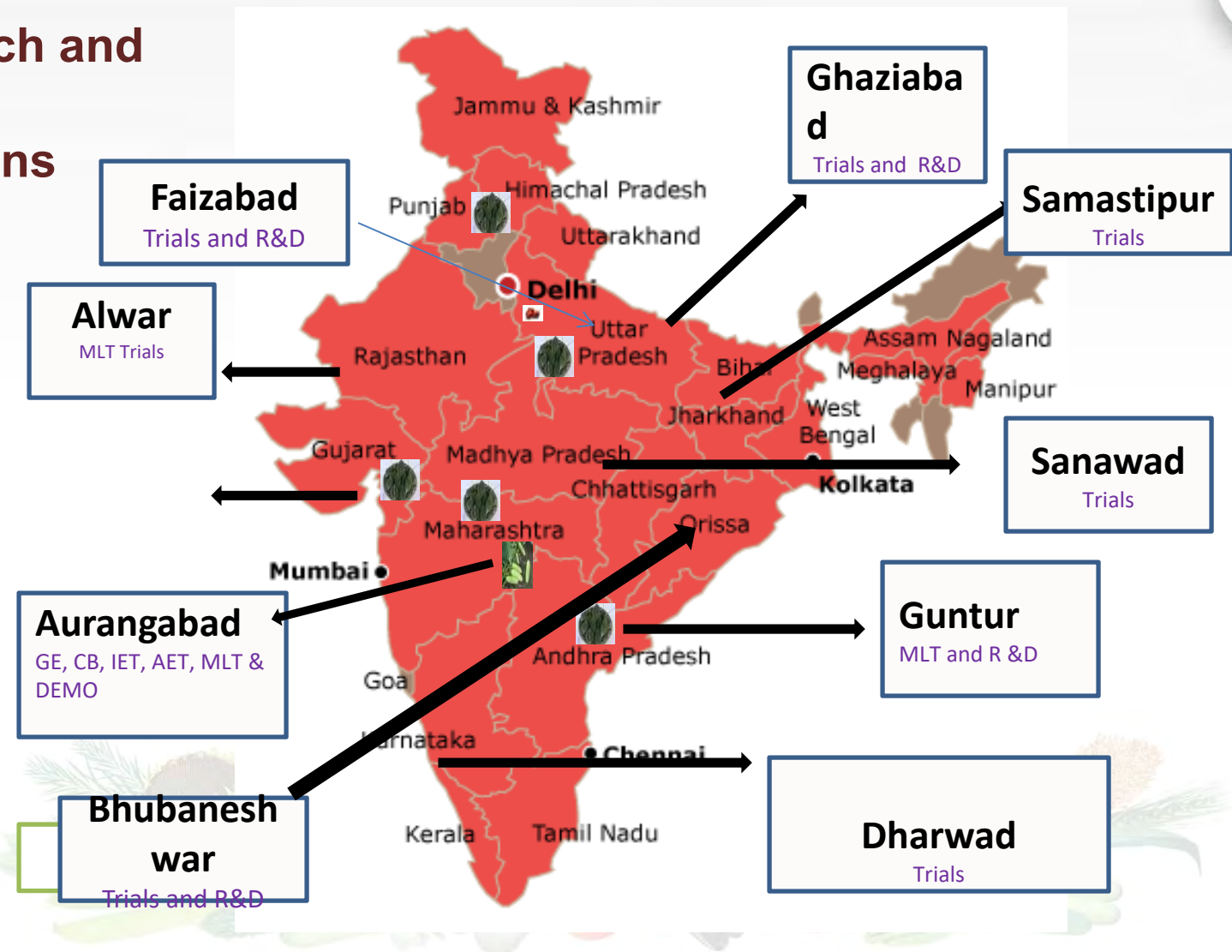


Production & Productivity





Research and Trialing Locations





OKRA



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Okra

- Total Acreage: 4.5 Lac hectares.
- Acreage under hybrids: 2.3 Lac hectares.
- Market Size : 1800 MT.
- Market Potential: Rs 300.0 crores.
- Okra ranks third having 12 % share among vegetables



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Breeding

Strategy -

- YVMV and ELCV are Major diseases of Okra
- Success in combined resistance to develop durable resistance
- Developing varieties for export markets
- Develop plant ideotype having shorter internodes
- Fruit quality: Smooth surface and deep green fruits
- Developing GMS lines to reduce cost of seed production and to manage quality



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New Promising Product

NOH-05 : **A wonder product**

- - Resistance to YVMV and ELCV
- - very good horticultural traits and yield
- Good tolerance to Jassids
- Excellent plant Ideotype with Short internodes
- **Performed well across the country with more yield over all major checks**
- Excellent fruit qualities
- We plan to take big share of okra market with this variety
- This is a very **unique product** in the market

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NOH-05

- A branching pattern not seen in any okra variety so far
- Excellent plant Ideotype
- Short internodes
- Around 150 fruits per plant

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NOH-05: USP'S

Improved plant type:

- Very short & more no. of internodes



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NOH-05: USP'S

Fruit quality:

- Attractive dark green tender medium long fruits
- Fruit length: 13-15 cm
- More & bold seeds > increased fruit weight



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Promising Pipeline Products

NOH-03 :

- - Resistance to YVMV and ELCV
- very good horticultural traits and yield
- Performed well across the country with more yield over all major checks
- Initial seed production is under progress (1000 kg)



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NOH-941 – Baby okra - A product for export and processing Industry

- Very short length
- Good shelf life
- Good for export markets



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TOMATO



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Tomato: Status In India

1. Tomato Ranks - 2nd

2. Area under cultivation - 865,000 (ha)

3. Total Seed Market - 167 tons

❖ HYBRID - 92 tons

❖ OP - 75 tons

❖ Major leader are;

1. Syngenta India
2. Namdhari seeds
3. US-Agri (Bayar crop science)
4. Semnis
5. Clause seeds

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Major Focus areas in tomato

- Wider resistance to Tolcv (Tomato leaf curl virus)
- Marker assisted breeding (MAB) incorporating Ty1, Ty2, and Ty3 genes – Good success
- Tospo (Tomato spotted wilt virus) resistance
- Early blight resistance
- Heat set
- Bacterial wilt
- Fruit firmness and good transport quality
- High lycopene
- High yield

TOLCV
Disease

TOSPO
Disease

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Tomato Segments and Potential Markets In India

| SN | Segment | Volume (MT) | Value (Crores) | Varieties |
|----|--------------------------------|-------------|-----------------|--------------------|
| 1 | To-Rainy (OVAL) | 21 | 84 | NTH 1900 |
| 2 | To-Rabi& sum (OVAL) | 9.8 | 73 | NTH 1894 |
| 3 | To-Rainy (Round) | 35 | 88 | NTH 1831, NTH 1909 |
| 4 | To-Sum-(Heat Set +Tolcv) Round | 8.6 | 26 | NTH 1910 |
| 5 | BW tolerant (Round) | 10 | 25 | NTH 1831, NTH 671 |
| 6 | ID Type | 7.9 | 24 | NTH 1914 |
| | Total | 92.3 | 320 | |

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TOSPO infected crop



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CHILLI



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Chilli - Present Market size

- Market volume- 140 MT (Hybrid seed)
- Value (Crore) - 275
- Major market area- AP,KA,MH,MP,UP and Rajasthan.





Focus of Chilli breeding

Work on both fresh market and red dry segments

Strong CGMS program:
Presently 20 stable CGMS lines being used

Solid germplasm base - 1400 lines available including species

Work is in good progress for resistance to thrips, powdery mildew and leaf curl virus



Capsicum chinense
- Source for leaf curl virus resistance

Shuttle breeding locations used for screening resistance to diseases and

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Present status

Fresh Green Segment:

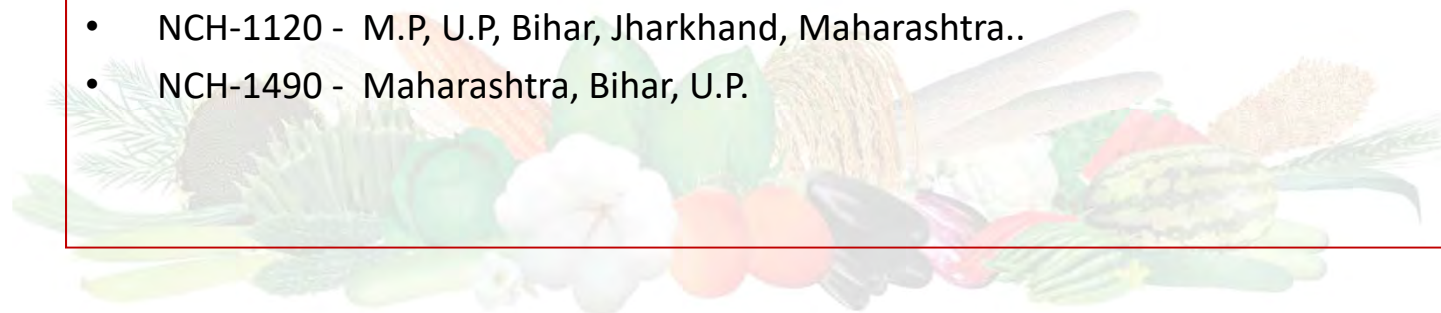
- NCH-886 - M.P., Karnataka, Gujarat.
- NCH 811 - Maharashtra, Odisha
- NVH 1526 - Maharashtra, Karnataka

Red Dry Segment:

- NCH-1055 - A.P, Karnataka.
- NCH 1814 - A. P.

Dual Short Segment:

- NCH-1120 - M.P, U.P, Bihar, Jharkhand, Maharashtra..
- NCH-1490 - Maharashtra, Bihar, U.P.





Bitter Gourd



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BITTERGOURD SEGMENTS and STATUS

| Sr. No. | Segment | Approx Volume (tonnes) | Approx Value (crore) |
|---------------------|-----------------------------------|------------------------|----------------------|
| 1 | Med.-long, green/ dark green, | 90.0 | 65.0 |
| 2 | Long, green, mild smooth prickles | 40.0 | 28.0 |
| 3 | Chu-Chu/ Short green | 20.0 | 14.0 |
| 4 | Long/ Med-long, smooth prickles | 10.0 | 7.0 |
| APPROX TOTAL | | 165.0 | 117.0 |



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Major Focus areas in Bitter gourd



- Resistance to Downy and Powdery mildew
- Resistance to viruses
- Good fruits quality as per market need
- Earliness
- High yielder
- Heat set
- Tolerance to sucking pest

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Major Products

- NBIH 274 – Tolerant to Viruses, Dark green Fruit
- NBIH 332 – Attractive fruits with dark green colour
- NBIH 541 – Smooth prickles long fruits, less bitter
- NBIH 608 – Medium long with smooth prickles

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NBIH- 274

- **Features:**
- A highly promising variety getting popular in several parts of the country
- High degree tolerance to mosaic virus and Downey mildew
- Dark green Fruit color
- Medium-Long Fruit, length about 15-16 cm
- 90-100 g Fruit weight
- Thick sharp dense Prickles
- First harvesting 50-55 days from sowing

• **High yield**

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CUCUMBER



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CUCUMBER SEGMENTS and MARKETS

| Segment | Commercial products | Approx Volume (tonnes) | Approx Value (crore) |
|---------------|------------------------------|------------------------|----------------------|
| Green long | Malini, Ninza, Tasty, Chitra | 135.0 | 189.0 |
| Whitish-green | Gypsi | 15.0 | 21.0 |
| TOTAL | | 150.0 | 210.0 |



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A very young program-

Presently we have only two products in the market

1. NCH -2
2. NCH 1061



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BRINJAL



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Brinjal Market Information

| | Area (000'ha) | Seed Qty (000'kg) | Seed Rate (kg/ha) | NRV Per Kg (Rs) | Share % | Market Value (Crores) |
|--------------|------------------|-------------------------|-------------------------|-----------------------|------------|-----------------------------|
| F1 | 420 | 105 | 0.250 | 7000 | 79 | 73.5 |
| OP | 110 | 35 | 0.350 | 600 | 21 | 2.1 |
| Total | 530 | 140 | | | 100 | 75.6 |



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Present Status:

Four hybrids released in different segments

NBH-1152 (Purple green white variegated spiny)

NBH-385 (Purple long),

NBH-386 (Purple round big),

NBH-442 (Dark purple round small),



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**THANK YOU
FOR
YOUR ATTENTION**



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Welcome

- **Madhav Dhande**
Business Lead



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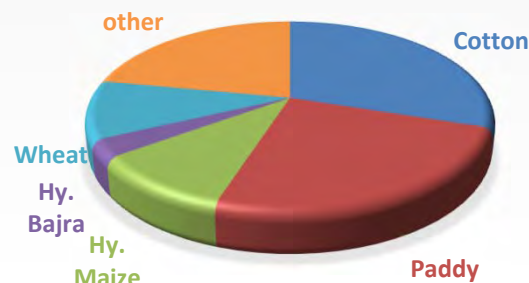
About Seed Industry

Rs. 10000 Crores Field Crops

Rs. 2500 Crores Hy. Organised Vegetables

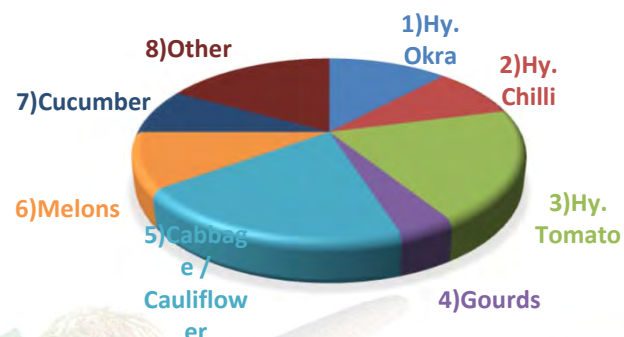
Contributing Crops : Field Crop

| | | |
|-----------------------|----------|-------------|
| 1) Cotton | 3000 Cr. | 30 % |
| 2) Paddy | 2500 Cr. | 25 % |
| 3) Hy. Maize | 1000 Cr. | 10 % |
| 4) Hy. Bajra | 300 Cr. | 3 % |
| 5) Wheat | 1000 Cr. | 10 % |
| Govt. of India KH -14 | | <u>78 %</u> |

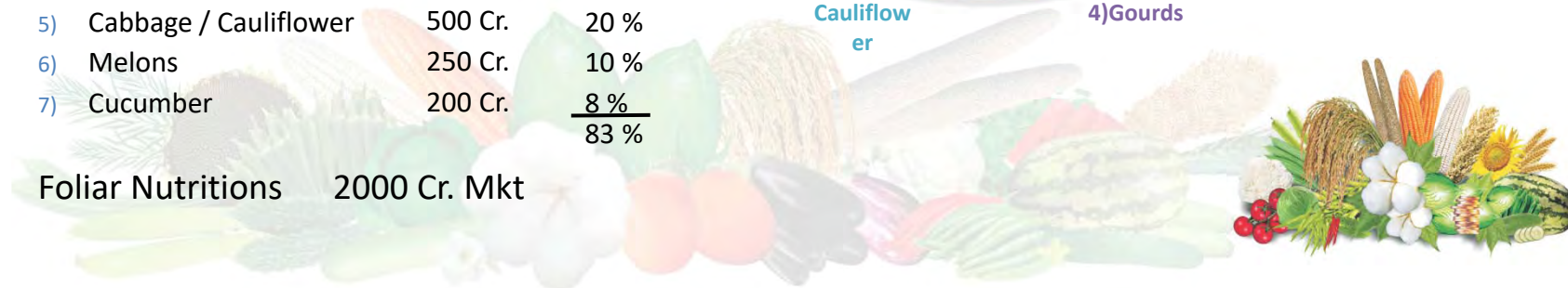


Contributing Crops : Vegetables

| | | |
|--------------------------|---------|-------------|
| 1) Hy. Okra | 300 Cr. | 12 % |
| 2) Hy. Chilli | 225 Cr. | 9 % |
| 3) Hy. Tomato | 500 Cr. | 20 % |
| 4) Gourds | 100 Cr. | 4 % |
| 5) Cabbage / Cauliflower | 500 Cr. | 20 % |
| 6) Melons | 250 Cr. | 10 % |
| 7) Cucumber | 200 Cr. | 8 % |
| | | <u>83 %</u> |



Foliar Nutritions 2000 Cr. Mkt



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Marketing

- 1) We are having 16 Business Centers
Having Storage / Accounts / Business Coordination
- 2) Team Consist of
 - a) Branch Managers / Regional Managers
 - b) Marketing Officers Territory based
 - c) Nos. of territories – 131 (Clusters)
- 3) Trade – Direct – FC 909 PNS-511 Veg – 598
Indirect – 7000 to 8000 Retailers
- 4) Distributor Network Separate for
Field Crop
Vegetable
Win-Chi-Win (PNS)



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Marketing Strategy

- 1) Right product at Right place. (Segment)
- 2) Timely Placement
- 3) Pre season meet (OPM) to own the budget at territory level
- 4) Close monitoring during season at trade level and need based corrective measures
- 5) Cut throat Competition is big issue for industry and desired solution is **basic demand generation which we are focusing (benefit selling)**
- 6) Regular Streamlining of trade network need based



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Our Excellence

- 1) Conceptual qualitative and quantitative field activities
- 2) 150000 Nath contact farmers
- 3) Now we are creating helpline for the farmers
- 4) We are planning to have direct live broadcast to farmers
- 5) Staff knowledge updation by periodical training
- 6) 200 Nath Farmers Advisors (NFA) working at village level
- 7) Right product at right place is emerged as a big strength
- 8) For Vegetable and Win Chi Win created separate vertical to have focused approach for this more profitable growing business

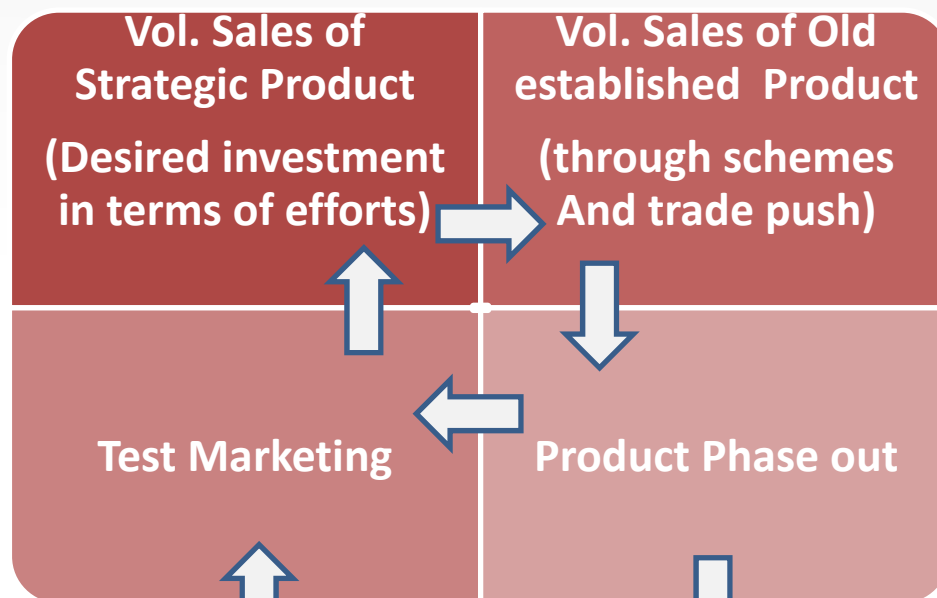


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Product Strategy



18 Testing Centers all over the country



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Product Line

| Crop | Introduction Products | Growing Products | Old Products |
|---------|--|--|---|
| COTTON | NBC 1103 and 1111 | NBC 102, NBC 1022 | Kashinath, Arjun |
| PADDY | No. G 45 / 63/ Hy. Bold/ NP 108 / NP 72 | Nath Poha / Gor. 509/ Lok. 505 / Tehalka/ Ford 140 / Shweta / Khushi / Menka /Gazab / Superduper | Lok. 510 / Kabir 508 / Rajani / Karina |
| BAJRA | NBBH 27 | NBBH 21/ NBBH 20 / NBBH 1717 / 301 Gold | Big B |
| MAIZE | AAA 1707 | NMH 1008 White NWMH 2002 | Don 1588 Nath Samrat 1144 |
| MUSTARD | Rajshree | Goldie, Super Sona | Sona 212 |
| WHEAT | Navnath Lalima & Two more coming up | Mohan Wonder | Notified phased out |

This product line gets the consistency to cope-up with market needs



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Developmental Activities to Create Presence

- 1) Working in selected clusters around 90 out of 131 for F/C and Veg 30 Clusters with dedicated team
- 2) Field Staff :
 - a) 100 on payroll + 200 NFA = 300
 - b) 10 Markets to be covered by each individual = 3000 Markets
 - c) 5 Villages per market = 15000 Villages
 - d) 10 contact farmers per village = 1.5 Lakhs contact farmers
- 3) 7 Crop shows on target crop per NFA = 1500 crop shows
(Crop shows for 50 to 100 farmers and 3 to 5 retailers to develop confidence)
- 4) 1 TSM/MO has to conduct minimum 1 Mega field day of 300 to 500 farmers + 25 to 30 Trade partners. Accordingly minimum 100 mega field days in which media and department of Agriculture gets involved



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PBW AWARENESS VAN CAMPAINING DURING APRIL 18

| Area | Village Covered | Farmers Covered |
|--------------------|-----------------|-----------------|
| VIDHARBHA | 315 | 33550 |
| MARATHWADA | 904 | 49080 |
| KHANDESH | 218 | 13880 |
| GRAND TOTAL | 1437 | 96510 |

It's a major problem to the cotton cultivation and we took adequate steps to create an awareness particularly in MS/MP/GUJ



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GROWTH

Industry is growing with the pace of 12%

We are aiming to grow for next 3 years with the pace of 20 – 25%

HOW

1)

| 17-18 | 18-19 | 19-20 | 20-21 |
|---------|---------|----------|----------|
| 5 Lakhs | 8 Lakhs | 15 Lakhs | 25 Lakhs |

 and our present base is narrow

2) Res. Paddy is giving us good growth. Nath Poha has emerged as industry Rice.

3) From Hy. Okra we are getting phenomenal growth

4) Virus free tomato added beauty to our product line

5) Win Chi Win a Crop balancer is getting an acceptance in majority of crops like orchards, Pulses, Oil seeds, Cotton, Cumin, Potato, etc. and growth is more than 25% year on year.





Thank You



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