**2B. Development of high yielding hybrids resistant to wilt complex, *Botrytis* and leaf hopper for early, late sown *kharif* crop as sole /intercrop, rabi situations**

**2.12. Generation of new hybrids in the project**

* Tenpistillate lines *viz*., DPC-16, 17, 9, M-574, 584, M-619, JP-87, 88, Geeta, SKP-72 were crossed with 7 male lines to generate 70 hybrids for estimation of heterosis and combining ability in 2011-12 *kharif*.
* The following 4 pistillate lines and 5 male lines were used to generate 20 preliminary hybrids for evaluation of hybrids during *kharif* 2012-13 in a line x tester mating design. Among the female lines, DPC-15 is the earliest duration pistillate line while DPC-19 and DPC-21 are late duration pistillate lines.

**Parents used for heterosis breeding ( 2011-12)**

|  |  |
| --- | --- |
| **Female lines** | **Male lines** |
| DPC-15 | DCS-105 |
| DPC-16 | DCS-107 |
| DPC-19 | DCS-108 |
| DPC-21 | DCS-81 |
|  | RG-1526 |

* Fifty five new crosses were generated using the pistillate lines *viz.*, DPC-21, M-574, M-571, DPC-9, DPC-17 and DPC-9 mutant with several inbred lines with high per se performance, early and medium maturity like DCS-64, DCS-86, DCS-94, DCS-102, DCS-104, DCS-105, DCS-108, SKI-283, SKI-301, SKI-304, JI-227, JI-244, JI-315, JI-319, JI-338, JI-340, TMV-5, DCS-78, 48-1. The crosses were evaluated both under rainfed and irrigated conditions in *kharif* 2013.
* 13 pistillate lines and 35 male lines wee maintained in a crossing block in *rabi* season. The following sets of crosses were made to generate new hybrids and further evaluation both under rainfed and irrigated conditions in kharif 2015 (Table 27).

**Table 27. Parents used in development of hybrids (2014-15)**

|  |  |  |
| --- | --- | --- |
|  **Set**  | **Female** | **Male** |
| I | DPC-16, DPC-21,DPC-23, DPC-25 | DCS-81, DCS-84,DCS-86, DCS-89, DCS-94, DCS-106, Haritha, DCS-78, Gandhi, PVT-12-2, JI-226, JI-227, JI-319, JI-322, JI-338, JI-340, JI-384, SKI-215, SKI-283,SKI-294, SKI-301, MCI-3, MCI-8, GC-3 |
| II | DPC-18, DPC-19, DPC-20 | DCS-9, 48-1, DCS-78, DCS-107, Haritha, GC-3 |
| III | DPC-21, DPC-23, DPC-24, DPC-25, M-571, M-574 | GP-101, GP-401, GP-407, GP-432, GP-487, GP-489, GP-493, GP-526, GP-537, GP-538, GP-568, GP-585, GP-640, GP-672, GP-674, GP-699, GP-712, GP-729, GP-737, GP-752, GP-753, GP-759, GP-764, GP-778, GP-783, GP-788, GP-789 |

**2.13. Evaluation of hybrids in Preliminary hybrid Trials for seed yield**

Among 15 hybrids evaluated in a randomised block design in two replications during *kharif* 2011-12, four hybrids viz., JP-87 × RG-1740/A, JP-87 × DCS-106, DPC-17 × RG-156 and DPC-17 × DCS-106 with high mean seed yield per plant and standard heterosis over DCH-177 were identified as the significant outcome of the study on heterosis and combining ability. The hybrid JP-87 *×* RG-1740/A was significantly superior to high yielding check DCH-177 for seed yield (206%), total spike length, effective spike length and number of capsules per primary spike, JP-87 *×* DCS-106 both for seed yield and oil content. The lines JP-87 and DCS-106 were good general combiners for seed yield and several other yield components.

In a preliminary hybrid evaluation trial, 35 hybrids were evaluated in an Augmented randomised block design along with 3 checks *viz*., DCH-177, DCH-519 and GCH-7 replicated after every five entries.

In 2012-13, 20hybrids generated in 2011 rabi season were evaluated along with the parental lines and 3 checks in a RBD of two replications. The hybrids were grown in a wider spacing of 90 x 90 cm under rainfed conditions. Seed yield was calculated from a net plot of 2 rows (20 plants) from each entry. The results indicated that DCS-107 was a good combiner for all the pistillate lines in the trial *viz*., DPC-15, DPC-16, DPC-17, DPC-19 and DPC-21. The hybrids like PHT-12-2 (DPC-15 x DCS-105), PHT-12-3 (DPC-15 x DCS-107) with >40% increase over the highest yielding check, GCH-7 (2330 kg/ha) were very early maturing (100 days to primary spike), short plant height (40 cm) with good branching potential (10-13 effective spikes per plant) and may have a potential under late sown rainfed conditions. The cross DPC-16 x DCS-107 recorded highest seed yield (3601 kg/ha) with 55% increase over the best check, GCH-7 (2330 kg/ha).



DPC-19

In Preliminary hybrid trial, Set-II, 24 hybrids were evaluated for seed yield and yield components along with three checks in a un replicated trial. The hybrids were grown in a wider spacing of 90 x 90 cm under rainfed conditions. Seed yield was calculated from a net plot of 2 rows (20 plants) from each entry. The hybrid PHT-10-23 (DPC-9 x SKI-283) was the highest yielding with 85% increase over the best check DCH-177 (1233 kg/ha) followed by PHT-10-31 (DPC-18 x DCS-102) and PHT-10-22 (DPC-9 x SKI-232) with 82 and 65% increase over the best check (Table 28).

**Table 28. Performance of top five hybrids in Preliminary hybrid trial-I (2012-13)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Hybrid** | **Parentage** | **Seed yield (kg/ha)** | **Heterosis over GCH-7 (%)** |
| PHT-12-2 | DPC-15 x DCS-105 | 3473 | 49 |
| PHT-12-3 | DPC-15 x DCS-107 | 3291 | 41 |
| PHT-12-7 | DPC-16 x DCS-107 | 3601 | 55 |
| PHT-12-12 | DPC-19 x DCS-107 | 2692 | 16 |
| PHT-12-17 | DPC-21 x DCS-107 | 3189 | 37 |
| DCH-177 © |  | 1210 |  |
| DCH-519 © |  | 1021 |  |
| GCH-7 © |  | 2330 |  |

**Table 29. Performance of top ten hybrids in Preliminary hybrid trial-II (2012-13)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Hybrid** | **Plant height (cm)** | **Number of nodes to** | **Primary spike length (cm)** | **No. of effective spikes per plant** | **100-seed weight (g)** | **Final seed yield (kg/ha)** | **Heterosis over the best check****(%)** |
| **Pr.** | **S1** | **S2** | **Total** | **Effective** |
| PHT-10-12 | 43 | 11.0 | 5.6 | 6.8 | 44.8 | 31.75 | 7.2 | 28.2 | 1830 | 48 |
| PHT-10-14 | 51 | 11.4 | 5.2 | 5.2 | 49.5 | 47.5 | 7.8 | 32.9 | 1752 | 42 |
| PHT-10-22 | 58 | 13.0 | 4.8 | 6.0 | 51.6 | 45.4 | 8 | 26.7 | **2033** | 65 |
| PHT-10-23 | 65 | 12.4 | 4.8 | 6.0 | 59.8 | 56.2 | 6 | 32.9 | **2286** | 85 |
| PHT-10-25 | 46 | 11.0 | 4.8 | 5.2 | 46.6 | 43.4 | 9.6 | 30.5 | 1869 | 52 |
| PHT-10-26 | 60 | 12.4 | 6.2 | 6.6 | 61 | 58.2 | 6.6 | 27.7 | 1921 | 56 |
| PHT-10-27 | 62 | 12.4 | 5.4 | 6.4 | 53.8 | 53.8 | 7.2 | 34.5 | 1966 | 59 |
| PHT-10-28 | 49 | 11.4 | 4.4 | 5.4 | 46.6 | 42.4 | 6.8 | 25.8 | 1955 | 59 |
| PHT-10-31 | 93 | 15.6 | 6.4 | 6.8 | 47.6 | 47.6 | 9 | 25.6 | **2239** | 82 |
| PHT-10-34 | 64 | 12.6 | 5.6 | 6.2 | 51.4 | 45.6 | 9.6 | 26.4 | 1902 | 54 |
| DCH-177 | 63 | 12.4 | 5.6 | 6.8 | 56.6 | 53.2 | 7.4 | 28 | 1126 |  |
| DCH-519 | 72 | 13.2 | 6.4 | 8.2 | 58.4 | 50.6 | 8.6 | 22.8 | 1233 |  |
| GCH-7 | 119 | 17.4 | 7.6 | 9.0 | 69.4 | 60.2 | 6.2 | 26.9 | 900 |  |

Thirty three hybrids of the PHT-I and II were evaluated for resistance to *Fusarium* wilt in wilt sick plot at DOR, Hyderabad. The hybrids like PHT-10-6, 9, 14, PHT-12-6, 10, 11, 12, 14, 15, 18, 19 and DCH-1551 were resistant to wilt in the wilt sick plot (Table 30).

**Table 30. Screening of preliminary hybrids in wilt sick plot, DOR, Hyderabad (2012-13)**

|  |  |  |
| --- | --- | --- |
| **Entries**  | **Plant Stand** | **Wilt incidence (%) DAS** |
| **30 days**  | **60 days** | **90 days**  | **120 days**  | **150 days**  | **180 days**  |
| PHT- 10- 6 | 27 | 3.9 | 3.9 | 3.9 | 7.7 | 7.7 | 7.7 |
| PHT- 10- 9 | 24 | 0.0 | 7.7 | 11.6 | 11.6 | 11.6 | 11.6 |
| PHT-10-14 | 28 | 0.0 | 10.7 | 10.7 | 10.7 | 21.4 | 21.4 |
| PHT-12-6 | 25 | 3.9 | 11.9 | 11.9 | 11.9 | 11.9 | 19.9 |
| PHT-12-10 | 29 | 3.6 | 6.9 | 6.9 | 6.9 | 10.2 | 10.2 |
| PHT-12-11 | 27 | 0.0 | 0.0 | 3.6 | 7.4 | 7.4 | 7.4 |
| PHT-12-12 | 27 | 0.0 | 7.4 | 11.3 | 15.1 | 15.1 | 18.7 |
| PHT-12-14 | 29 | 3.6 | 3.6 | 7.2 | 7.2 | 7.2 | 13.8 |
| PHT-12-15 | 27 | 0.0 | 0.0 | 3.6 | 7.4 | 7.4 | 11.0 |
| PHT-12-17 | 26 | 7.7 | 11.5 | 15.4 | 19.2 | 19.2 | 23.1 |
| PHT-12-18 | 30 | 6.7 | 10.0 | 13.3 | 13.3 | 13.3 | 13.3 |
| PHT-12-19 | 30 | 0.0 | 3.4 | 6.7 | 6.7 | 6.7 | 6.7 |
| DCH-1551 | 14 | 0.0 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| JI -35 (C) | 26 | 11.5 | 34.6 | 76.9 | 84.6 | 88.5 | 100.0 |
| 48-1(c) | 26 | 0.0 | 0.0 | 0.0 | 3.3 | 3.3 | 3.3 |

Evaluation of preliminary hybrids for major pests and diseases indicated that DCH-1566 (M-571 x DCS-106), PHT-10-11 (DPC-21 x DCS-78) were resistant to leaf hopper. Among 33 hybrids, PHT-10-6, PHT-10-9, PHT-10-14, PHT-12-6, PHT-12-10, PHT-12-11, PHT-12-12, PHT-12-14, PHT-12-15, PHT-12-18, PHT-12-19 and DCH-1551 were resistant to wilt in the wilt sick plot.

****

PHT-10-31 (DPC-18 x DCS-102)

PHT-12-3 (DPC-15 x DCS-107)

In 2013-14, 50hybrids were grown in four rows in an augmented randomized block design (ARBD) along with two checks replicated after every 10 entries in two sets. Promising hybrids were identified based on seed yield and resistance to wilt.

Among 20 hybrids evaluated in PHT-I for the second year, two hybrids *viz*., PHT-12-15 (DPC-21 x DCS-81), PHT-12-17 (DPC-21 x DCS-107) reconfirmed their yield potential over the national check, DCH-519 (306 g/pl) and wilt resistance in wilt sick plot. In addition, PHT-12-2 (DPC-15 x DCS-105), a short duration hybrid (80-90 days to primary spike) with short plant height (46 cm), good branching potential (10-13 effective spikes per plant) reconfirmed for its yield potential with 37 % increase over the national check, DCH-519 (306 g/pl).

**Table 31. Performance of hybrids in PHT-I, (2013-14)**

|  |  |  |
| --- | --- | --- |
| **Hybrid** | **Parents** | **Final seed yield (g/pl)** |
| PHT-2012-2 | DPC-15 x DCS-105 | 420 |
| PHT-2012-15 |  DPC-21 x DCS-81 | 626 |
| PHT-2012-17 | DPC-21 x DCS-107 | 613 |
| DCH-519 © |  | 306 |
| Mean  |  | 367 |
| CV (%) |  | 10 |

In PHT-II, among 30 hybrids, PHT-12-3, PHT-12-8, PHT-12-9, PHT-12-10, PHT-12-21 were high yielding with 30-67 % yield increase over check DCH-519 (367 g/pl). All the 30 hybrids were also evaluated in the wilt sick plot at DOR, Hyderabad. Among the top five high yielding hybrids, PHT-12-3, PHT-12-9, PHT-12-21 involving JI-244 male parent were also resistant to wilt in wilt sick plot (Table 30).

**Table 32. Performance of hybrids in PHT-II for yield and wilt resistance (2013-14)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hybrid** | **Parents** | **Effective spike length (cm)** | **Final seed yield** **(g/pl.)** | **Wilt incidence (%) in wilt sick plot** |
| PHT-II-2012-3 | DPC-9 x JI-244 | 45.3 | 555 | 9.1 |
| PHT-II-2012-8 | VP-1 x JI-227 | 31.5 | 600 | 46.2 |
| PHT-II-2012-9 | VP-1 x JI-244 | 38.1 | 560 | 0 |
| PHT-II-2012-10 | VP-1 x JI-322 | 37.5 | 613 | 12.5 |
| PHT-II-2012-21 | M-571 x JI-244 | 45.1 | 478 | 0 |
| DCH-519 © |  | 43.6 | 367 |  |
| Mean |  | 37.2 | 356 |  |
| CV (%) |  | 3.43 | 9.6 |  |

In 2014-15**,** 35 hybrids were grown in four rows in an augmented randomized block design (ARBD) along with two checks replicated after every 10 entries. The trial is taken up under rainfed conditions. The hybrids involving new pistillate line DPC-25 had very long spikes (60-70 cm) with loose and high number of capsules. Thirteen hybrids recorded 10-100% significant yield increase over the best check, DCH-519 (1360 kg/ha). The hybrid, PHT-14-29 (DPC-25 x DCS-113) with 100 % yield increase over the check is of medium plant height (100 cm), with 12 nodes to the primary recorded a desirable proportion of monoecious (4 cm) on a long primary spike (65 cm). The hybrids ,PHT-14-8 (67%), PHT-14-13 (68%), PHT-14-12 (70%), PHT-14-3 (73%), PHT-14-29 (100%) will be further evaluated in a randomized replicated trial in large scale plots and wilt resistance in wilt sick plot (Table 31).

**Table 33. Promising hybrids In PHT-I under rainfed conditions (2014-15)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Hybrid** | **Seed yield (kg/ha)** | **Days to 50% flowering** | **Effective spike length (cm)** |
| PHT-14-27 | 1480 | 50 | 62 |
| PHT-14-6 | 1502 | 45 | 36 |
| PHT-14-23 | 1643 | 46 | 61 |
| PHT-14-16 | 1732 | 47 | 70 |
| PHT-14-18 | 1742 | 48 | 47 |
| PHT-14-28 | 1875 | 55 | 72 |
| PHT-14-30 | 1994 | 54 | 70 |
| PHT-14-10 | 2013 | 45 | 46 |
| PHT-14-8 | 2277 | 45 | 47 |
| PHT-14-13 | 2286 | 45 | 24 |
| PHT-14-12 | 2316 | 49 | 51 |
| PHT-14-3 | 2351 | 43 | 37 |
| PHT-14-29 | 2722 | 45 | 66 |
| DCH-519 © | 1360 | 42 | 63 |
| DCH-177 © | 1101 | 46 | 55 |
| C.D. (P=0.05) |  |  |  |
| Treat. Vs control | 109 | - | 19.5 |

 Thirty five hybrids were reevaluated in an ARBD with two checks-DCH-177, DCH-519 replicated after every ten rows. The following hybrids were found promising.

**Promising hybrids of PHT-I under rainfed conditions, IIOR, Hyderabad(2014-15)**

|  |
| --- |
| PHT-14-29, PHT-14-3, PHT-14-12 PHT-14-8, PHT-14-30, PHT-14-10 PHT-14-28, PHT-14-18, PHT-14-16 PHT-14-23, PHT-14-49, PHT-14-6, PHT-14-27 |

**2.14. Evaluation of hybrids in Common evaluation hybrid trial (CEH):** A pool of136 hybrids generated at DOR, Hyderabad were evaluated in a common hybrid trial under rainfed conditions at DOR, Hyderabad and irrigated conditions at Anand in kharif 2013. The genotypes were sown in two rows in an Augmented randomized block design (ARBD) along with two checks *viz*., DCH-177, DCH-519 at DOR and DCH-519 and GCH-7 at Anand replicated after every 10 entries.

At Anand, CEH-108 with 57% significant increase over the best check GCH-7 (4102 kg/ha), followed by CEH-68, CEH-134 (47%), CEH-133 (41%), CEH-40 (20%) and CEH-73 with 30% significant increase over the national check DCH-519 (3796 kg/ha) will be further reconfirmed next year under irrigated conditions (Table 32).

Among 43 hybrids evaluated in wilt sick plot at DOR, Hyderabad, the following were resistant to wilt. Two high yielding hybrids *viz*., CEH-68 (M-574 x JI-315) and CEH-73 (DPC-23 x DCS-104), which were also resistant to wilt will be further evaluated in multi-location coordinated trials.

**Table 34. Wilt resistant hybrids in common evaluation hybrid trial**

|  |
| --- |
| Wilt incidence (%) in wilt sick plot |
| Nil | 1-10 % | 11-20 % |
| CEH-45,CEH-49,CEH-55,CEH-58, CEH-61, CEH-74 | CEH-44,CEH-47, CEH-48,CEH-54, CEH-57,CEH-62, CEH-63,CEH-67,CEH-68,CEH-70, CEH-78, CEH-80 | CEH-37,CEH-38, CEH-42,CEH-43,CEH-44,CEH-59CEH-60,CEH-65, CEH-69,CEH-71, CEH-72,CEH-73, CEH-75,CEH-76, CEH-77 |

The same set of hybrids when evaluated under rainfed conditions at DOR, Hyderabad, severe incidence of *Botytis* grey mold during October 2013 followed by two spells of the incidence resulted in complete loss of the primary and secondary spikes. The crop has revived due to rains under North East monsoon period and further harvested. Among the 136 hybrids, CEH-40 was the highest yielding hybrid followed by CEH-78, CEH-73 with > 20% yield increase over the check DCH-519 (300 g/pl).

In 2014-15**,** 90 new hybrids were evaluated both under rainfed conditions at IIOR, Hyderabad and irrigated conditions at Anand. Ninetyhybrids were grown in two rows in an augmented randomized block design (ARBD) along with two checks replicated after every 10 entries with a spacing of 90 x 60 cm at IIOR, Hyderabad and 120 x 60 cm spacing at Anand. Promising hybrids identified were further reconfirmed in *kharif* 2015 both for seed yield and wilt resistance. The highest yielding hybrid, CEH-137 (5496 kg/ha) under irrigated conditions at Anand was poor yielding under rainfed conditions indicating the responsiveness of the hybrid for high input under irrigated conditions (Table 33 to 36).

**Table 35. Promising hybrids at IIOR, Hyderabad under rainfed conditions (2014-15)**

|  |  |  |  |
| --- | --- | --- | --- |
| Hybrid | Seed yield (kg/ha) | Days to 50% flowering | Effective spike length |
| CEH-152 | 1477 | 42 | 46 |
| CEH-172 | 1427 | 46 | 55 |
| CEH-185 | 1478 | 43 | 52 |
| CEH-192 | 1872 | 50 | 55 |
| CEH-193 | 1948 | 50 | 66 |
| DCH-177 | 1099 | 40 | 56 |
| DCH-519 | 778 | 45 | 61 |
| C.D. (P=0.05) |  |  |  |
| Treat. Vs control | 1304 | - | 23.5 |

**Table 36. Promising hybrids at Anand, under irrigated conditions (2014-15)**

|  |  |  |  |
| --- | --- | --- | --- |
| Hybrid | Seed yield (kg/ha) | Days to 50% flowering | Effective spike length |
| CEH-137 | 4869 | 58 | 68 |
| CEH-216 | 4750 | 62 | 69 |
| CEH-217 | 4211 | 65 | 84 |
| CEH-176 | 4007 | 68 | 70 |
| DCH-519 | 2509 | 61 | 62 |
| GCH-7 | 2818 | 60 | 61 |
| C.D. (P=0.05) |  |  |  |
| Treat. Vs control | 1821 | 8.9 | 15.8 |

**Table 37. Promising hybrids of CEH trial , IIOR and Anand (2014-15)**

|  |  |
| --- | --- |
| **Rainfed conditions** | **Irrigated conditions** |
| CEH-205, CEH-204, CEH-226,CEH-180,CEH-178, CEH-181CEH-179,CEH-206, CEH-220CEH-221, CEH-177, CEH-156 | CEH-137,CEH-156,CEH-214, CEH-215,CEH-176, CEH-145,CEH-173, CEH-154, CEH-200,CEH-164, CEH-187, CEH-216 |

**Table 38. Promising hybrids of Common Evaluation Hybrid Trial, Anand (2013-14)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Hybrids** | **Days to 50 % flowering** | **Plant height****(cm)** | **Effective spike** **Length (cm)** | **Number of effective spikes per plant** | **Number of capsules per primary** | **Seed yield (kg/ha)** | **Volume weight****(g/ml)** |
| **Primary** | **Secondary** | **Tertiary** | **Total** |
| CEH-40 | 58 | 76.1 | 58.9 | 12.5 | 87 | 1918 | 1574 | 1431 | 4923 | 935 |
| CEH-68 | 67 | 126.0 | 74.6 | 17.7 | 76 | 678 | 1191 | 4147 | 6017 | 882 |
| CEH-73 | 57 | 70.9 | 72.5 | 11.8 | 121 | **1172** | 1679 | 2080 | 4931 | 47.3 |
| CEH-99 | 56 | 86.8 | 51.9 | 11.1 | 72 | 791 | 775 | 3382 | 4948 | 925 |
| CEH-108 | 59 | 89.6 | 84.2 | 14.2 | 135 | 1269 | 1460 | 3729 | 6458 | 916 |
| CEH-133 | 66 | 92.8 | 75.4 | 14.3 | 88 | 1175 | 1461 | 3136 | 5772 | 925 |
| CEH-134 | 66 | 84.0 | 84.0 | 18.3 | 128 | 1715 | 604 | 3728 | 6047 | 859 |
| DCH-519 | 59 | 80.0 | 70.0 | 12.0 | 94 | 646 | 943 | 2207 | 3796 | 922 |
| GCH-7 | 61 | 80.9 | 66.3 | 15.5 | 81 | 561 | 830 | 2711 | 4102 | 894 |
| Mean | 57.9 | 78.5 | 62.8 | 12.6 | 83.9 | 711.0 | 765.9 | 1722.9 | 3199.9 | 906 |
| CV (%) | 6.1 | 12.2 | 8.8 | 16.1 | 13.7 | 25.1 | 34.2 | 24.4 | 13.3 | 3.7 |
| CD between |  |  |  |  |  |  |  |  |  |  |
| Checks | 1.3 | 7.8 | 4.5 | 1.7 | 9.4 | 145.6 | 98.9 | 342.9 | 346.4 | 27.7 |
| Tr vs Checks | 4.4 | 25.5 | 14.8 | 5.4 | 30.8 | 477.3 | 324.3 | 1124.2 | 1135.6 | 90.8 |

**2.15. Hybrids for coordinated multi location trials:** Three hybrids viz., DCH-1642, PHT-14-44 and PHT-14-46, evaluated in National Screening Nursery for Wilt (NSNW) were resistant to wilt with <20 per cent wilt incidence at SK Nagar and IIOR, Hyderabad. Among them, the hybrid seed of PHT-14-44 was produced in isolation for including in the coordinated multi location trials along with another early duration, wilt resistant hybrid PHT-12-3 which is produced by hand pollination (Table 39).

**Table 39. Evaluation of hybrids in National Screening Nursery for Wilt**

|  |  |  |
| --- | --- | --- |
| **Entries**  | **Plant Stand** | **Wilt incidence ( % )** |
| **IIOR,****Hyderabad** | **S.K. Nagar** | **IIOR, Hyderabad** | **S.K. Nagar** |
| DCH-1642 | 44 | 48 | 20.2 | 8.3 |
| PHT-14-44 | 52 | 56 | 9.8 | 19.6 |
| PHT-14-46 | 52 | 57 | 15.3 | 7.0 |
| DCS -109 | 47 | 42 | 15.1 | 19.0 |
| DCS -119 | 56 | 52 | 5.4 | 0.0 |
| 48-1 | 48 |  | 5.6 |  |
| JI-35 | 48 |  | 100 |  |

Two hybrids *viz*., DCH-1551 (DPC-9 x DCS-106) and DCH-1566 (M-571 x DCS-106) were contributed to the AICRP coordinated multi location trials in 2012-13. Among them, DCH-1566 is resistant to wilt and leafhopper (Table 38, Table 39 and Table 40).

**Table 40. Mean performance of DCH-1566 in IHT (2012-13)\***

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Entry** | **Pooled yield over locations (kg/ha)** |
|  | **Rainfed****(7 locations)** | **Irrigated****(10 locations)** | **National average****(17 locations)** |
| 1 | DCH-1551 | 1425 | 2707 | 2315 |
| 2 | DCH-1566 | 1172 | 2414 | 2021 |
| 3 | GCH-7 | 1415 | 2806 | 2373 |
| 4 | DCH-177 | 1599 | 2456 | 2234 |
| 5 | DCH-519 | 1294 | 2534 | 2150 |
|  | Mean  | 1274 | 2682 | 2233 |
|  | S.E m+ | 65 | 65 | 48 |
|  | CD (p=0.05) | 181 | 182 | 132 |
|  | CV (%) | 20 | 13 | 15 |

**Table 41. Reaction of DCH-1566 to *Fusarium* wilt in three sick plots (2012-13)\***

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Entry** | **Wilt incidence (%)** |
| DOR | Palem | SK Nagar |
| 1 | DCH-1551 | 55.2 | 39.6 | 45.8 |
| 2 | DCH-1566 | 13.1 | 43.6 | 4.2 |
| 3 | GCH-7 | 19.8 | 15.6 | 0.0 |
| 4 | DCH-177 | 27.4 | 19 | 26.5 |
| 5 | DCH-519 | 42.5 | 54.3 | 35.6 |
|  | JI-35 (S) | 100 | 98 | 98 |
|  | 48-1 (R) | 0 | 1.7 | 0 |

\*Source Table 3.6 a-c; Annual Report, Castor, 2014-15: 163-164 p.

**Table 42. Reaction of DCH-1566 to leaf hopper in three locations (2012-13)\***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Entry** | **Palem** | **Yethapur** | **SKNagar** |
| Number /3 leaves/plant | Hopper burn | Number /3 leaves/plant | Hopper burn | Number /3 leaves/plant |
| 1 | DCH-1551 | 38.4 | 4 | 17 | 0 | 15.3 |
| 2 | DCH-1566 | 20.4 | 2 | 21.2 | 1 | 7.7 |
|  3 | GCH-7 | 12.5 | 1.0 | 28.3 | 2 | 5.3 |
| 4 | DCH-177 | 50.4 | 4.0 | 17.6 | 0 | 10.7 |
| 5 | DCH-519 (R ) | 42.2 | 1.0 | 22.3 | 1 | 11.7 |

 Source Table 4.2.3. Annual Report, Castor, 2012-13: 193 pp

 In 2014-15**, t**hree hybrids were produced in isolation with DCS-107 as a male parent. Two hybrids *viz*., DCH-1720 or PHT-12-17 (DPC-21 x DCS-107) with 37% increase and DCH-1715 or PHT-12-12 (DPC-19 x DCS-107) with 15% increase over the best check GCH-7 (2330 kg/ha) and resistant to wilt in the National Screening Nursery on Wilt (NSNW) both at DOR and SK Nagar were included in the AICRP Initial hybrid trial (IHT). Among them, DCH-1720, a wilt and leaf hopper resistant line is promoted to AHT-I (Table 41, 42, 43).

**Table 43. Mean performance of DCH-1720 in Initial Hybrid Trial (2014-15)\***

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Entry** | **Pooled yield over locations (kg/ha)** |
|  |  | **Rainfed****(12 locations)** | **Irrigated****(11 locations)** | **National average****(23 locations)** |
| 1 | DCH-1715 | 1516 | 3270 | 2355 |
| 2 | DCH-1720 | 1492 | 3327 | 2369 |
| 3 | **GCH-7** | **1579** | **3211** | **2360** |
| 4 | **DCH-177** | **1488** | **3246** | **2329** |
| 5 | **DCH-519** | **1403** | **3276** | **2299** |
|  | Mean  | 1444 | 3193 | 2281 |
|  | SEm+ | 35 | 82 | 43 |
|  | CD (p=0.05) | 98 | 228 | 120 |
|  | CV (%) | 15 | 15 | 16 |

\*Source Table 2.18.1.3. Annual Report, Castor, 2014-15: 73pp.

**Table 44. Reaction of DCH-1720 to *Fusarium* wilt in three sick plots (2014-15)\***

|  |  |  |
| --- | --- | --- |
|  |  | **Wilt incidence (%) in sick plots**  |
| **S. No.** | **Entry** | **2014-15** | **2015-16** |
| IIOR | Palem | SK Nagar | IIOR | Palem | SK Nagar |
| 1 | DCH-1715 | 11.1 | 73.7 | 18.9 | Nt | Nt | Nt |
| 2 | DCH-1720 | 11.6 | 0.0 | 3.6 | 8.1 | 25 | 3.8 |
| 3 | GCH-7 | 27.5 | 57.1 | 10.9 | 11.4 | 16.7 | 0.0 |
| 4 | DCH-177 | 32.6 | 66.7 | 61.9 | 40.5 | 43.3 | 40 |
| 5 | DCH-519 | 27.7 | 81.3 | 27.1 | 23 | 25 | 3.8 |
|  | JI-35 (S) | 100 | 94.1 | 98.0 | 87.5 | 100 | 100 |
|  | 48-1 (R) | 3.8 | 7.7 | 0.0 | 6.0 | 5.6 | 0 |

\*Source Table 3.6 a-c; Annual Report, Castor, 2014-15: 163-164 p.

**Table 45. Reaction of DCH-1720 to leaf hopper in three locations (2014-15)\***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Entry** | **Palem** | **Yethapur** | **SKNagar** |
| Number /3 leaves/plant | Hopper burn | Number /3 leaves/plant | Hopper burn | Number /3 leaves/plant |
| 1 | DCH-1715 | 31.0 | 4 | 6.0 | 1 | 12.3 |
| 2 | DCH-1720 | 12.0 | 1 | 2.6 | 0 | 9.0 |
| 3 | GCH-7 | 27.5 | 2 | 1.0 | 0 | 2.3 |
| 4 | DCH-177 | 24.0 | 2 | 3.6 | 0 | 6.3 |
| 5 | DCH-519 (R ) | 21.1 | 2 | 5.6 | 1 | 3.7 |
|  | DPC-9 (S) | 41.8 | 4 | 12.3 | 3 | - |

 Source Table 4.2.3. Annual Report, Castor, 2014-15: 189 pp

 The hybrid DCH-1720 (DPC-21 x DCS-107), with green stem color, double bloom and good branching potential recorded an yield advantage of 7% (1630 kg/ha) over the national check, DCH-519 (1528 kg/ha) under rainfed conditions and 5.4 %, 5.8% and 7.8% over the three checks, GCH-7 ( 3113 kg/ha), DCH-519 (3101 kg/ha) and DCH-177 (3044 kg/ha) for two years. Overall performance indicated that DCH-1720 (2412 kg/ha) yielded 5 -6% higher than DCH-519 (2295 kg/ha) and DCH-177 (2271 kg/ha) respectively. The hybrid is resistant to wilt in wilt sick plots at IIOR and SK Nagar representing raifed and irrigated centers respectively. The hybrid is now in third year of testing in coordinated multi location trials (AICRP AHT-II) during 2015-16 (Table 44, 45, 46).

**Table 46. Mean performance of DCH-1720 over two years under rainfed conditions**

**(2014-2015)**

|  |  |  |
| --- | --- | --- |
| **Year of testing** | **Number of locations** | Seed yield kg/ha) |
| **DCH-1720** | **GCH-7** | **DCH-519** | **DCH-177** |
| Year 1 (2014-15) | 12 | 1492 | 1579 | 1403 | 1488 |
| Year 2 (2015-16) | 9 | 1706 | 1699 | 1695 | 1598 |
|  | Mean | **1895** | **1762** | **1748** | **1637** |
| Weighted mean | **1584** | **1630** | **1528** | **1535** |
| **% increase over checks** | **GCH-7** | **DCH-519** | **DCH-177** |
| Year 1 (2014-15) | -5.5 | 6.3 | 0.3 |
| Year 2 (2015-16) | 0.4 | 0.6 | 6.8 |
| % increase over checks for two years (mean) | **7.5** | **8.4** | **15.7** |
| % increase over checks for two years (weighted mean) | **-2.9** | **6.7** | **-0.5** |

**Table 47. Mean performance of DCH-1720 over two years under irrigated conditions (2014-2015)**

|  |  |  |
| --- | --- | --- |
| **Year of testing** | **Number of locations** | **Seed yield kg/ha)** |
| **DCH-1720** | **GCH-7** | **DCH-519** | **DCH-177** |
| Year 1 (2014-15) | 11 | 3327 | 3211 | 3276 | 3246 |
| Year 2 (2015-16) | 9 | 3226 | 2993 | 2886 | 2798 |
| Mean | **3684** | **3114** | **3081** | **3135** |
| Weighted mean | **3282** | **3113** | **3101** | **3044** |
| **% increase over checks** | **GCH-7** | **DCH-519** | **DCH-177** |
| Year 1 (2014-15) | 3.6 | 1.6 | 2.5 |
| Year 2 (2015-16) | 7.8 | 11.8 | 15.3 |
| % increase over checks for two years (mean) | 5.6 | 6.3 | 8.4 |
| % increase over checks for two years (weighted mean) | **5.4** | **5.8** | **7.8** |

**Table 48. Overall mean performance of DCH-1720 over two years (2014-2015)**

|  |  |  |
| --- | --- | --- |
| **Year of testing** | **Number of locations** | **Seed yield (kg/ha)** |
| **DCH-1720** | **GCH-7** | **DCH-519** | **DCH-177** |
| Year 1 (2014-15) | 23 | 2369 | 2360 | 2299 | 2329 |
| Year 2 (2015-16) | 18 | 2466 | 2346 | 2290 | 2198 |
| Mean | **2418** | **2353** | **2295** | **2264** |
| Weighted mean | **2412** | **2354** | **2295** | **2271** |
| **% increase over checks** | **GCH-7** | **DCH-519** | **DCH-177** |
| Year 1 (2014-15) | **0.4** | **3.0** | **1.7** |
| Year 2 (2015-16) | **5.1** | **7.7** | **12.2** |
| % increase over checks for two years (mean) | **2.7** | **5.4** | **6.8** |
| % increase over checks for two years (weighted mean) | **2.5** | **5.1** | **6.2** |