**2.5. Evaluation of advanced linesand open pollinated varieties (OPVs) in Preliminary varietal trials**

In 2010-11**,** PVT-I, 72 advanced lines were sown in 6 blocks of 2 row plot (10.8 sq.m) each in an Augmented RBD (ARBD) along with 5 checks *viz*., DCS-9, DCS-78, DCS-107, DCS-5, Haritha replicated after every 12 lines for seed yield and yield components. Among them, 15 lines *viz*., Kh-2010-164, 165, 166, 167, 168, 171, 173, 188, 194, 195, 209, 234, 235, 237, 239 were found promising.

In another set of trial (PVT set II),230 advanced lines were sown in 11 blocks of a single row each in ARBD along with 5 checks *viz*., DCS-9, DCS-78, DCS-107, DCS-5, Haritha replicated after every 20 lines. Among them, 81 lines were promising for yield components like total and effective secondary spike length and number of effective spikes per plant.

 In 2011-12,129 advanced lines were evaluated in three sets in an augmented randomized block design (ARBD) along with 3 checks replicated after every 5 or 10 selections under rainfed conditions. Among 60 selections in Set-I, PVT-10-31 with highest seed yield per plant (107g), high 100-seed weight (33g) and medium long effective primary spike length (42 cm) followed by PVT-10-140 (104 g/pl), long effective primary spike length (67 cm) were promising (Table 17). Other promising advanced lines included early duration advanced lines *viz*., PVT-10-15, 21, 53, 54, 93, 103, 125, 127 with 34-44 days to 50 % flowering and 81-88 days to maturity which are on par with early duration check DCS-9 (Table 18).

**Table 17. Promising high yielding advanced lines in Preliminary Varietal Trial-I**

(Kharif rainfed 2011-12)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Advanced line** | **Days to 50% flowering** | **Days to maturity** | **Effective spike length (cm)**  | **Seed yield (g/pl)** |
| PVT-10-31 | 65 | 95 | 42 | 107\* |
| PVT-10-112 | 77 | 99 | 67\* | 93\* |
| PVT-10-114 | 75 | 100 | 67\* | 92\* |
| PVT-10-115 | 79 | 99 | 63\* | 90\* |
| PVT-10-116 | 75 | 102 | 64\* | 89\* |
| PVT-10-118 | 64 | 97 | 51\* | 91\* |
| PVT-10-140 | 58 | 83 | 67\* | 104\* |
| DCS-9 © | 39 | 81 | 25 | 54 |
| 48-1 © | 59 | 96 | 37 | 71 |
| DCS-107 © | 61 | 97 | 37 | 70 |

\* Significantly above the check

**Table 18. Promising early duration advanced lines in Preliminary Varietal Trial-I**

**(*kharif* rainfed 2011-12)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Advanced line** | **Days to 50% flowering** | **Days to maturity** | **100 seed weight (g)** | **Oil (%)** | **Seed yield (g/pl)** |
| PVT-10-15 | 40 | 88 | 29 | 52 | 60 |
| PVT-10-21 | 42 | 88 | 27 | 51 | 57 |
| PVT-10-53 | 39 | 84 | 23 | 46 | 62 |
| PVT-10-54 | 44 | 82 | 23 | 49 | 59 |
| PVT-10-93 | 44 | 82 | 25 | 51 | 63 |
| PVT-10-103 | 41 | 84 | 26 | 46 | 76 |
| PVT-10-125 | 41 | 81 | 29 | 47 | 60 |
| PVT-10-127 | 34 | 82 | 22 | 43 | 49 |
| DCS-9 © | 39 | 81 | 25 | 45 | 54 |
| 48-1 © | 59 | 96 | 29 | 46 | 71 |
| DCS-107 © | 61 | 97 | 29 | 46 | 70 |

Among 25 advanced lines in Set-II, PVT-10-104, 105, 128, 129, 140, 143 were higher yielding compared to the checks (Table 4). Among 44 advanced lines in Set-III, PVT-11-5, 9, 10, 17, 18, 20, 22, 25, 30, 34, 41, 45, 46, 48, 50 were promising for seed yield. PVT-11-8, 18, 19, 29, 42, 46, 47, 48, 49, 54, 57, 59 recorded high 100 seed-weight (32-35 g) (Table 19).

**Table 19. Promising high yielding advanced lines for different traits in Preliminary varietal trials (kharif 2011-12)**

|  |  |  |  |
| --- | --- | --- | --- |
| Trait | PVT-I | PVT-II | PVT-III |
| Early duration (82-90 days to first picking)  | PVT-10-15, PVT-10-53, PVT-10-93, PVT-10-96, PVT-10-125, | PVT-11-10, PVT-11-11, PVT-11-24 | PVT-11-30, PVT-11-61 |
| Medium to late duration (91-120 days to first picking) | PVT-10-30, PVT-10-31, PVT-10-86, PVT-10-104, PVT-10-105, PVT-10-128, PVT-10-140, PVT-10-143 | PVT-11-5, PVT-11-9, PVT-11-17, PVT-11-19, PVT-11-20, PVT-11-21 | PVT-11-34, PVT-11-41, PVT-11-45, PVT-11-46, PVT-11-47, PVT-11-48, PVT-11-50, PVT-11-57, PVT-11-59, PVT-11-60, PVT-11-65 |
| High 100 seed weight (32-35g) | PVT-10-47, PVT-10-102, PVT-10-118, PVT-10-129, PVT-10-132, PVT-10-136, PVT-10-140 | PVT-11-6, PVT-11-8, PVT-11-**17, PVT-11-18,** PVT-11-19 | PVT-11-29, PVT-11-35, PVT-11-42, PVT-11-44, PVT-11-45, PVT-11-46, PVT-11-47, PVT-11-48, PVT-11-49, PVT-11-52, PVT-11-54, PVT-11-57, PVT-11-59, PVT-11-70 |
| 100 seed weight (30-35g) and high oil content ((50-52%) | PVT-10-7,PVT-10-30, PVT-10-46,PVT-10-47 | PVT-11-62PVT-11-68PVT-11-69 |  |
| Wilt resistant (0-20% wilt incidence in wilt sick plot) | PVT-11-2, PVT-11-3, PVT-11-8, PVT-11-11, PVT-11-13, PVT-11-**17, PVT-11-18, PVT-11-**24 |

 In 2012-13,Preliminary varietal trial (PVT), Set-I, 173 advanced selections were grown in three rows in an augmented randomized block design (ARBD) along with three checks replicated after every 10 selections. Seed yield was calculated from a net plot of 2 rows (20 plants) from each entry. Advanced lines were selected based on three criteria viz., early maturity, high seed yield and monoecious trait (with 2-3 whorls of male flowers).

Twenty four selections which were on par with the early duration check DCS-9 for number of nodes to primary spike but significantly high yielding compared to the highest yielding check *viz.,* DCS-107 (2232 kg/ha) were selected as promising male lines (Table 16). Among the 24 selections, PVT-12-104 was the highest yielder (3970 kg/ha) followed by PVT-12-4 (3778 kg/ha) and PVT-12-172 (3181 kg/ha). The line PVT-12-9 recorded highest 100 seed weight (30.3g).

**Table 20. Advanced line for early maturity and seed yield (2012-13)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Advanced****line** | **Plant height****(cm)** | **Number of nodes to** | **Spike length** | **Number of effective spikes per plant** | **Seed yield****(kg/ha)** |
| **Primary** | **S-1** | **S-2** | **Total****(cm)** | **Effective****(cm)** |
| PVT-12-2 | 51 | 13.2 | 5.4 | 6.6 | 48.9 | 43.7 | 8.0 | 2613 |
| PVT-12-4 | 64 | 14.0 | 6.4 | 6.6 | 51.3 | 48.9 | 7.6 | **3778** |
| PVT-12-9 | 49 | 11.6 | 4.6 | 5.0 | 29.9 | 26.7 | 11.8 | 2721 |
| PVT-12-10 | 55 | 12.4 | 4.2 | 4.8 | 37.5 | 33.3 | 8.4 | 2603 |
| PVT-12-11 | 69 | 12.6 | 4.6 | 4.8 | 41.9 | 36.5 | 5.4 | 2566 |
| PVT-12-12 | 57 | 11.8 | 4.6 | 5.2 | 39.3 | 33.9 | 7.4 | 2494 |
| PVT-12-13 | 53 | 12.2 | 5.2 | 5.4 | 41.3 | 37.3 | 6.6 | 2543 |
| PVT-12-19 | 55 | 12.8 | 6.0 | 6.2 | 43.9 | 41.3 | 8.2 | 2493 |
| PVT-12-56 | 76 | 14.5 | 7.1 | 8.6 | 47.3 | 46.2 | 5.6 | 2465 |
| PVT-12-70 | 78 | 13.1 | 5.0 | 6.0 | 35.9 | 35.5 | 6.9 | 2760 |
| PVT-12-76 | 68 | 13.5 | 5.1 | 6.5 | 44.0 | 42.2 | 6.0 | 2476 |
| PVT-12-95 | 78 | 13.8 | 5.0 | 6.2 | 47.2 | 40.9 | 6.0 | 2486 |
| PVT-12-96 | 73 | 13.0 | 5.6 | 6.6 | 38.6 | 34.3 | 5.6 | 2499 |
| PVT-12-97 | 68 | 13.6 | 5.2 | 6.0 | 44.4 | 41.9 | 5.6 | 2416 |
| PVT-12-98 | 68 | 14.2 | 4.6 | 6.4 | 52.8 | 50.7 | 7.4 | 2672 |
| PVT-12-99 | 65 | 13.6 | 4.8 | 5.8 | 42.6 | 41.3 | 7.8 | 2348 |
| PVT-12-104 | 69 | 13.4 | 5.4 | 5.8 | 40.2 | 35.2 | 8.9 | **3970** |
| PVT-12-115 | 49 | 13.0 | 5.5 | 6.6 | 31.1 | 26.9 | 6.7 | 2602 |
| PVT-12-116 | 52 | 12.6 | 5.5 | 6.6 | 31.3 | 27.5 | 7.3 | 2683 |
| PVT-12-117 | 61 | 13.6 | 5.9 | 7.2 | 39.5 | 35.9 | 7.1 | 2519 |
| PVT-12-118 | 60 | 13.2 | 5.3 | 6.0 | 32.1 | 30.3 | 8.3 | 2573 |
| PVT-12-151 | 76 | 14.0 | 6.7 | 7.0 | 23.0 | 17.5 | 7.7 | 2486 |
| PVT-12-162 | 78 | 13.1 | 5.3 | 7.0 | 53.9 | 43.5 | 8.4 | 2516 |
| PVT-12-172 | 90 | 14.3 | 6.3 | 7.2 | 37.1 | 37.3 | 6.6 | **3181** |
| DCS-9 (C) | 50 | 12.5 | 5.5 | 6.3 | 33.2 | 30.4 | 7.1 | 1597 |
| DCS-107 (C) | 105 | 15.3 | 7.0 | 7.9 | 36.8 | 35.6 | 5.1 | 2232 |
| 48-1 (C)  | 124 | 16.8 | 6.5 | 7.6 | 35.7 | 34.6 | 6.9 | 1971 |
| Mean | 77 | 13.9 | 6.1 | 7.0 | 37.91 | 35.29 | 6.9 | 1940 |
| CV (%) | 12 | 5.2 | 12.4 | 9.7 | 9.23 | 10.98 | 15.7 | 19 |
| CD Between |   |   |   |   |   |
| Checks | 6.8 | 0.54 | 0.56 | 0.51 | 2.62 | 2.90 | 0.81 | 276 |
| Treatments and checks | 21.8 | 1.72 | 1.81 | 1.64 | 8.41 | 9.32 | 2.59 | 887 |

In PVT Set II**,** 41 advanced selections were re-evaluated in an augmented randomized block design (ARBD) along with 3 checks replicated after every 5 selections. Seed yield was calculated from a net plot of 2 rows (20 plants) from each entry. Among 8 promising selections, PVT-11-59 recorded highest seed yield increase (35%) over the best check, DCS-107 (2322 kg/ha) followed by PVT-10-128 (15%) and PVT-10-127 (9%). PVT-10-125 and PVT-10-127 were early maturing and high yielding for two years. The eight lines will be used as male lines after testing their combining ability (Table 21).

**Table 21. Promising advanced lines for seed yield (2012-13)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Advanced line** | **Plant height****(cm)** | **Number of nodes to** | **Spike length (cm)** | **No. of effective spikes / plant** | **100 seed weight (g)** | **Seed yield (kg/ha)** |
| **Primary** | **S1** | **S2** | **Total** | **Effective** |
| PVT-10-67 | 168 | 16.2 | 7.4 | 8.6 | 45.4 | 44.6 | 4.6 | 24.6 | 2328 |
| PVT-10-125 | 78 | 13.2 | 5.0 | 6.4 | 44.8 | 39.6 | 7.0 | 28.8 | 2543 |
| PVT-10-127 | 53 | 11.4 | 4.8 | 5.4 | 32.8 | 30.2 | 7.6 | 19.5 | 2530 |
| PVT-10-128 | 130 | 16.4 | 7.8 | 9.0 | 53.8 | 48.6 | 4.8 | 27.4 | 2690 |
| PVT-11-10 | 75 | 13.4 | 6.6 | 7.4 | 50.6 | 48.4 | 7.8 | 35.4 | 2366 |
| PVT-11-19 | 118 | 15.2 | 7.4 | 7.6 | 45.4 | 43.0 | 7.4 | 27.9 | 2772 |
| PVT-11-59 | 150 | 15.2 | 8.0 | 9.0 | 49.6 | 44.2 | 6.4 | 35.0 | 3147 |

**Top five advanced lines for seed yield (*Kharif*, 2012-13)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Advanced line** | **Node number** | **Effective spike length(cm)** | **Seed yield (kg/ha)** |
| PVT-12-4 | 14.0 | 48.9 | **3778** |
| PVT-12-9 | 11.6 | 26.7 | 2721 |
| PVT-12-70 | 13.1 | 35.5 | 2760 |
| PVT-12-104 | 13.4 | 35.2 | **3970** |
| PVT-12-172 | 14.3 | 37.3 | **3181** |
| DCS-9 (C) | 12.5 | 30.4 | 1597 |
| DCS-107 (C) | 15.3 | 35.6 | 2232 |
| 48-1 (C)  | 16.8 | 34.6 | 1971 |
| CD | 1.72 | 9.32 | 887 |



PVT-11-10

PVT-10-127



DCS-109

In 2013-14**,** Preliminary varietal trial (PVT), Set-I, Set-II, 75 advanced lines were grown in four rows in an augmented randomized block design (ARBD) along with three checks *viz*., DCS-9, 48-1 and DCS-107 replicated after every 10 entries. Advanced lines were selected based on three criteria *viz*., early (90-110 days) or medium (111-130 days) maturity, high seed yield (>300 g/pl) and monoecious trait (with 2-3 whorls of male flowers).

Among 15 advanced lines evaluated for confirmation in PVT-II, PVT-II-11-2, PVT-II-11-19, PVT-II-11-34, PVT-II-11-60 and PVT-II-11-70 with 58-102% higher seed yield than the best check DCS-107 (328 g/pl) were promising for their early / medium maturity and monoecious trait.

Among the 60 advanced lines in PVT-I, PVT-I-12-2 was the highest yielder (668 g/pl) followed by PVT-I-12-76 (615 g/pl) and PVT-I-12-121 (495 g/pl) compared to the best check DCS-107 (328 g/pl). The advanced line PVT-I-2012-2 with 103% higher seed yield than DCS-107 was tolerant to *Botrytis* under severe incidence of the disease. It is also moderately resistant to leaf hopper (grade 1.1 to 2) (Table 22).

**Table 22. Performance of promising advanced lines in PVT(2013-14)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Advanced line** | **Plant height up to primary raceme****(cm)** | **Number of nodes to** | **Spike length (cm)** | **Number of effective spikes/plant** | **Hundred seed weight (g)** | **Seed yield (g/pl)** |
| **Primary** | **S 1** | **S2** | **Total** | **Effective** |
| PVT-I-12-2 | 58 | 12.6 | 4.6 | 4.6 | 35 | 34 | 12.1 | 26.1 | 668 |
| PVT-I-12-76 | 100 | 14.9 | 6.0 | 5.8 | 43 | 42 | 10.1 | 34.2 | 615 |
| PVT-II-12-2 | 82 | 12.4 | 4.9 | 4.2 | 45 | 45 | 9.7 | 30.0 | 637 |
| PVT-II-12-19 | 98 | 14.6 | 5.3 | 4.4 | 44 | 44 | 12.1 | 37.2 | 562 |
| PVT-II-12-34 | 88 | 14.0 | 6.1 | 4.2 | 43 | 41 | 9.6 | 35.6 | 603 |
| PVT-II-12-60 | 73 | 11.4 | 4.9 | 4.4 | 40 | 34 | 9.8 | 41.9 | 664 |
| PVT-II-12-70 | 90 | 13.6 | 6.9 | 5.6 | 43 | 44 | 7.0 | 22.8 | 520 |
| DCS-9 © | 60 | 12.1 | 5.8 | 4.9 | 31 | 31 | 7.3 | 26.0 | 159 |
| 48-1 © | 108 | 15.0 | 6.5 | 5.8 | 38 | 37 | 8.2 | 26.5 | 200 |
| DCS-107 © | 114 | 14.8 | 6.6 | 6.0 | 39 | 39 | 7.6 | 32.2 | 328 |
| Mean | 84.8 | 13.4 | 6.3 | 5.5 | 37.0 | 36.5 | 8.2 | 28.4 | 302.7 |
| C.V (%) | 17.4 | 8.1 | 6.4 | 6.2 | 9.9 | 10.4 | 11.5 | 9.2 | 12.0 |
| CD Tr. vs checks | 39.6 |  | 1.1 | 0.9 | 9.8 | 10.1 | 2.5 | 7.0 | 97.8 |
| CD between checks | 15.8 |  | 0.4 | 0.4 | 3.9 | 4.1 | 1.0 | 2.8 | 39.1 |

S1, S2 – Number of nodes to secondary 1 and secondary 2

In 2014-15, PVT-I, 240 advanced selections (F7) were grown in single rows in an augmented randomized block design (ARBD) along with three checks replicated after every 10 entries. Advanced lines were selected based on three criteria *viz*., early (90-110 days) or medium (111-130 days) maturity, high seed yield (>300 g/pl) and monoecious trait (with 2-3 whorls of male flowers). Among 240 advanced selections (F7) evaluated, 43 selections were promising based on visual score for spike length, capsule number on primary, branching and proportion of female to male flowers on the primary spike. All the 43 selections will be further re-evaluated for wilt resistance and seed yield.

 In PVT-II, 31advanced lines were re-evaluated in four row plots with a spacing of 90 cm x 60 cm spacing, replicated twice in a RBD under rainfed conditions. Majority of the entries were high yielding compared to the best check DCS-9. Among them, 16 entries were promising with significant yield increase over the best check –DCS-9 (578 g/plot).

**Table 23. Promising entries in PVT-II (2014-15)**

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Entry** | **Final seed yield (g/plot)** |
| 1 | PVT-12-160 | 2040 |
| 2 | PVT-12-104 | 1995 |
| 3 | PVT-12-103 | 1956 |
| 4 | PVT-12-8 | 1920 |
| 5 | PVT-12-4 | 1905 |
| 6 | PVT-12-98 | 1842 |
| 7 | PVT-12-121 | 1798 |
| 8 | PVT-12-6 | 1683 |
| 9 | PVT-12-15 | 1677 |
| 10 | PVT-12-3 | 1673 |
| 11 | PVT-12-9 | 1671 |
| 12 | PVT-12-2 | 1663 |
| 13 | PVT-12-125 | 1594 |
| 14 | PVT-12-76 | 1587 |
| 15 | PVT-12-7 | 1506 |
| 16 | PVT-12-167 | 1503 |
|  | DCS-9 © | 578 |
|  | DCS-107 © | 521 |
|  | 48-1 © | 395 |