

ABRIDGED REPORT 2017-18
OILSEEDS RESEARCH INSTITUTE, FAISALABAD



OVERVIEW

Edible oil is a high-energy source and an important constituent of human food. In Pakistan, edible oil is extracted from cottonseed, sunflower and rapeseed/mustard, especially canola. Other oilseed crops such as sesame, groundnut, linseed, jojoba and castor are not contributing directly to edible oil sector of Pakistan. The major oilseed crops grown in the country include Sunflower, Canola, Rapeseed/Mustard and Cotton.

During 2017-18, total availability of edible oil was 3.623 million tonnes. Local production of edible oil contributed 0.431 million tonnes while import of edible oil/oilseeds was 3.191 million tonnes. The edible oil import bill during 2017-18 was Rs.320.893 billion. World oilseed market has been showing downward trend since last few years which has also affected local market of oilseeds/edible oil. Low market prices and shifting of area to wheat crop discouraged the oilseed growers and resulted decrease in area under sunflower and canola crops during 2016-17.

Oilseeds Research Institute Faisalabad is engaged in improving productivity of oilseed crops through the evolution of better varieties/hybrids and through improved production technology. Major research emphasis is on sunflower, canola and sesame and focus is also on other crops. So far this institute has released three varieties of rapeseed and mustard (AARI-Canola, Rohi Sarson and Super Raya during the year 2016. Development of canola type brassica variety is pride of this institute. Salient features of the research work conducted during 2016-17 are presented in this section.

RESEARCH WORK

A. RAPESEED/MUSTARD

- a. **Zaid Kharif Brassica**
 - i. In preliminary yield trial, out of 17 strains tested, ZBJ-17008 out

yielded with production of 4000 kg/ha seed yield than AARI Canola (3359 kg/ha).

- ii. In advanced yield trial, 13 entries were tested in Zaid Kharif season. ZBJ-13015 gave the best seed yield i.e. 4081 kg/ha compared with the standard variety AARI Canola (3270 kg/ha).
- iii. In Micro Yield Trial, 11 strains were tested. ZBJ-12011 ranked first by producing average seed yield of 2455 kg/ha at 5 different locations of Punjab along with standard variety AARI Canola having seed yield 1824 kg/ha. While at ORI, FSD ZBJ-14013 ranked first with seed yield of 4054 kg/ha compared with standard variety AARI Canola (3276 kg/ha). All strains yielded more than check variety.

b. Rabi Brassica

Brassica napus L.

- i. In the preliminary yield trials, 11 entries were tested. The line RBN-17014 stood first with seed yield of 3366 kg/ha compared with 2744 kg/ha seed yield from Faisal Canola, the standard variety.
- ii. In advanced yield trial, 10 entries were tested in Rabi season. The advance line RBN-16001 out yielded with the seed yield of 3602 kg/ha compared with 2417 kg/ha seed yield from Faisal Canola and 1723 of Rohi Sarson, the standard varieties.
- iii. In micro yield trials, out of 09 entries tested, RBN-13017 ranked first by producing average seed yield of 2502 kg/ha from 7 locations whereas, Faisal Canola,

the standard variety, produced the seed yield of 2189 kg/ha.

- iv. In Hybrid development programme of Canola, 12 local hybrids were evaluated during 2017-18. The hybrid FHC-126 remained at the top by producing average seed yield of 3500 kg/ha, whereas Hyola-401, the commercial hybrid produced average seed yield of 3296 kg/ha.

Brassica Juncea

- i. In the preliminary yield trial out of 13 strains tested, RBJ-17010 produced the seed yield of 4378 kg/ha. Whereas Super Raya produced seed yield of 3978 kg/ha as a standard variety.
- ii. In advanced yield trial, 14 entries were tested. RBJ-15015 produced the seed yield of 3817 kg/ha whereas standard varieties; Khanpur Raya and Super Raya produced seed yield of 3314 kg/ha and 3175 kg/ha respectively.
- iii. In micro yield trials, out of 09 entries tested at 7 locations, RBJ-15016 ranked 1st by producing average seed yield of 3256 kg/ha, whereas Super Raya, produced the seed yield of 2689 kg/ha.

B. SUNFLOWER

The main research objective of sunflower breeding programme is the development and testing of local sunflower hybrids, maintenance of cytoplasm male sterile and fertility restorer inbred lines.

- i. 32 sunflower hybrids were evaluated against Hysun-33 (Check) during spring 2018. Two hybrids out yielded than Hysun-33(check). FH-741 ranked first with seed yield 2861 kg/ha followed by the hybrid FH-751

- (2635 kg/ha) when compared with check, Hysun-33 (2527 kg/ha).
- ii. Seed of nine promising hybrids was multiplied during 2017-18 for further evaluation in Micro Yield Trial and National Uniform Yield Trial.
 - iii. Twenty new hybrid combinations were developed during 2017-18 by pollinating different "A" lines with selected "R" lines for testing in station yield trials.
 - iv. In Micro Yield Trial, 11 sunflower hybrids were tested at eight locations including four checks. The Hybrid S-278 (check) ranked first with average seed yield of 2945 kg/ha. FH-555 (2479 kg/ha) surpassed the check Hysun-33 (2403 kg/ha).



Sunflower at Flowering Stage.

C. SESAME

- i. In Preliminary yield trial, promising lines 86003 and 86001 gave the highest yield 2413 & 2101 kg/ha respectively while the line 17004 gave the minimum yield 102 kg/ha.
- ii. In advance yield trial strain 87006 and TS-5(C) gave the maximum yield 1607 kg/ha and 1579 kg/ha, where as the minimum yield 151 kg/ha was obtained from TH-6.
- iii. In Micro Seed Yield trial strain 50009 and 40004 gave the

maximum yield 1135.3 kg/ha than check varieties TS-5 which produced seed yield 1077 kg/ha. The minimum yield 548 kg/ha was obtained from 16001.

- iv. In NUSYT sesame entries SG-133 and NS-260-SP4 gave the maximum yield 1051 kg/ha and 1024 kg/ha, respectively against the check varieties TS-5, which produced 549 kg/ha. Our 50011 got forth position in NUSYT with yield 756 kg/ha. Whereas the minimum yield 537 kg/ha obtained from entry JS-015.

D. SOYBEAN

- i. In Preliminary yield trial, out of 8 lines tested, Duglas out yielded all entries producing 1854 kg/ha seed yield compared with check varieties i,e Faisal Soybean (1733 kg/ha) and Ajmeri (638 kg/ha).
- ii. In advanced yield trial 7 entries were tested. MS-4 gave the best yield i.e. 1856 kg/ha compared with the check varieties Faisal Soybean (1701 kg/ha) and Ajmeri (624 kg/ha).
- iii. In Micro yield trial, 6 entries were tested for their yield potential. Promising line 95-1-14 gave highest yield 1690 kg/ha against the check varieties Faisal Soybean (1642 kg/ha) and Ajmeri (674 kg/ha).

E. LINSEED

- i. High yielding, lodging resistant and early maturing variety Roshni (LS-147) has been approved by Pakistan Seed Council during 2018.



Roshni at Flowering Stage

- ii. Nine new strains were evaluated against the standard variety Chandni in Preliminary Yield Trial. Highest yield was given by LS-17007 (2087 kg/ha) followed by LS-17043 with respective yield of 1849 kg/ha, whereas the yield of Chandni (check) was 1396 kg/ha.
- iii. In Advance Yield Trial, six new genotypes were evaluated against the standard variety Chandni. LS-16006 was the highest yielder (1775 kg/ha) followed by LS-16020 (1499 kg/ha). Standard variety Chandni yielded 1337 kg/ha.
- iv. In Zonal Varietal Trial, five entries were tested for their yield potential against the standard variety Chandni. Highest yield was given by LS-15014 (1546 kg/ha) followed by LS-15022 (1444 kg/ha) while the yield of check variety (Chandni) was 1273 kg/ha.
- ii. 42 samples of 14 locally developed sunflower hybrids in set II (three replications of each) were tested for their oil contents. Maximum oil contents 39.53% were observed in FH 621 while lowest oil contents were estimated in FH 685 (31.36%).
- iii. 42 samples of 14 locally developed autumn sunflower hybrids (three replications of each) were tested for their oil contents. Maximum oil contents 39.20% were observed in FH 688 while minimum oil contents were estimated in FH 685 (36.17%).
- iv. 30 samples with triplicate (total ninety) samples of sunflower influenced by different fertilizer rates were tested for their oil contents. Maximum oil contents 37.94% were observed at P_0N_5 followed by P_0N_4 having oil content 37.67%. Minimum oil contents were found at P_2N_5 (33.29%).
- v. 183 samples of 61 sunflower inbred lines (three replications of each) were tested for their oil contents. Maximum oil contents 31.03% were observed in ORI 85B while minimum oil contents were determined in ORI 37B (18.33%).

F. OIL TECHNOLOGY

Sunflower

- i. 39 samples of 13 locally developed sunflower hybrids in set I (three replications of each) were tested for their oil contents. Maximum oil contents 38.55% were observed in FH 710 followed by FH 708 having oil content 38.26%. Minimum oil contents were found in FH 701 (33.59%).

vi.

Brassica

123 samples of 41 summer mustard lines (three replications of each) were tested for their oil contents. Maximum oil contents 46.44% were observed in B.J (PYT) and E4 followed by B.J (MYT). Minimum oil contents were observed in B.J (AYT) and E8 (34%).

Soybean

42 samples of 14 lines of soybean (three replications of each) were tested for their oil contents. Maximum oil contents 25.10% were observed in FS-60 followed by Faisal Soybean having oil content 24.09. Minimum oil contents were estimated in L-16 (20.32%).

G. OILSEEDS PATHOLOGY

Mustard

During last year 2017-18 nine cultivars of *Brassica juncea* were screened against different diseases. Disease incidence of *Alternaria* blight was 30-50%. Only two lines RBJ-15016 and RBJ-15786 have 30% disease incidence. White rust disease did not appear in any line. No line was disease free.



Alternaria Blight on Leaves

RAPESEED

During 2017-18 nine cultivars of *Brassica napus* were screened against different diseases. Disease incidence of *Alternaria* bligh was 20-40%. Minimum disease was 20% on RBN-13017. White rust disease appearance was not appeared. No cultivar of *Brassica napus* was disease free. Powdery mildew and Downey mildew did not appear on both

Brassicae juncea and *napus* during the season.



Alternaria Blight on Grains

SUNFLOWER

In first experiment, out of 20 new advance hybrids screened against charcoal rot disease, 9 cultivars showed resistant reaction (B disease rating scale). In NUSYT, out of 12 hybrids, five hybrids showed resistant reaction (B disease rating scale) and six hybrids showed moderately resistant reaction (C disease rating scale) against charcoal rot disease.



Sunflower Charcoal Rot

None of the hybrids from local and NUSYT trails tested against head rot disease showed resistant reaction.



Sunflower Head Rot

SESAME

Ten lines were screened against charcoal rot disease which appeared from 14-50%. Minimum disease was 14% on entry 50009 and 50022 while it was maximum on entry TH-6 i.e 50% in sick field.



Charcoal Rot

In case of phyllody, the disease incidence was 5 to 10%. Out of 10 lines screened, two lines i.e 16001 and TH-6 showed minimum disease incidence 5%.



Phyllody of sesame

H. OILSEED ENTOMOLOGY

- i. Thirteen strains of *Brassica juncea* were sown to test their behavior against mustard aphids under natural conditions. The maximum aphid population was found on *Brassica juncea* line KJ-244 (37) followed by RBJ-14012 (32) and RBJ-1451 (28), respectively. The minimum population of mustard aphid was found on RBJ-14011 (14) and BRJ-238 (14). It also revealed that the population of aphid remained below ETL on all the above tested *Brassica juncea* lines.
- ii. Nine entries of *Brassica napus* were sown to test their behavior against aphids under natural conditions. Population below economic threshold level was found on all the tested genotypes. However, minimum aphid population was recorded on the line Faisal Canola (20) followed by KN-279 (26).
- iii. The source population was sown in the field under natural conditions. Thirty Five healthy plants free from aphid attack were selected for further testing as single plant progenies during next season.

- iv. Twenty promising hybrids of sunflower were sown to test their behavior against different insect pests of sunflower under natural conditions. The data revealed that the population of whitefly did not reach ETL level in all hybrids. Lowest population (0.06) was found on hybrid FH-744 while maximum population (0.30) was observed on hybrids i.e FH-516, FH-713 and FH-739. The population of jassid remained above ETL on all the tested hybrids. Minimum population was observed in hybrid FH-516 (4.04). Maximum population (7.75) was recorded in hybrid FH-750. In case of Head moth larvae, the population remained below ETL level on all tested hybrids. No head moth population was observed on sunflower hybrids i.e Hysun-33, FH-713, FH-743 and FH-744. While the maximum population (0.46) was observed in FH-735.
- v. Silicon (Sodium Silicate) was applied on sunflower crop at different doses to induce resistance against insect pest complex. It was observed that low populations of whitefly (0.08) and Jassid (3.96), were recorded where silicon was applied @ 1000 g/acre. Minimum population of Head Moth (0.33) was recorded where silicon was applied @ 800 and 1000 g/acre. Maximum populations was observed in control treatment.
- vi. Maximum mortality was observed in Radiant (83%) followed by Coragen (80%), Steward (78.3%), Proclaim (76.66%) and Match (72%).
- vii. Nitrogen was applied at different doses (Recommended, 20% & 40% higher and 20% lower than recommended). Lowest population of whitefly (1.15) was observed where 20% less dose of nitrogen was applied than recommendation. Minimum population of Jassid (5.48) was observed in treatment where recommended dose of nitrogen was applied. Minimum population of Head Moth (0) was recorded where recommended and 20% higher than recommended nitrogen was applied.

OILSEED RESEARCH STATION KHANPUR

- i. In the preliminary yield trial of *B.juncea*, 17 entries were tested. The line KJ-273 stood first with seed yield of 3241 kg/ha while in *B. napus* KN-231 produced highest yield 2500 kg/ha.
- ii. In advanced yield trial of *B. juncea*, 11 entries were tested in Rabi season. The advance line KJ-258 out yielded with the seed yield of 2981 kg/ha while in *B. napus*, the highest yield 3222 kg/ha was produced by KN-309.
- iii. Among agronomic trials, *B. juncea* produced highest yield at plant to plant spacing of 22.5 cm while *B. napus* at 15 cm.
- iv. The highest raya yield of 1790 kg/ha was achieved when it was broad casted in sugarcane.

**v. OILSEED RESEARCH STATION
BAHAWALPUR**

Data of PYT, AYT and MYT of
Safflower is in progress.

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