

**ICAR-Directorate of Rapeseed-Mustard Research,
Bharatpur**

Highlights of 26th Annual Group Meeting of AICRP on Rapeseed-Mustard

26th annual group meeting of All India Coordinated Research Project on Rapeseed-Mustard was held at Birsa Agricultural University Ranchi from 3-5 August 2019. The inaugural session started with 'Kulgeet' of Birsa Agriculture University, and ICAR song followed by the welcome speech by Dr. D.N. Singh, Director (Research), BAU, Ranchi. He welcomed all delegates and participants of annual group meeting and gave an overview of green revolution era, which transformed India from food deficit to surplus position by virtue of the consistent efforts of the scientists, policy makers and farmers towards increasing the food grain productivity. Similar increase in oilseed productivity can be achieved by making the oilseed farming more remunerative in oilseed production, capturing rice-fallow area under rapeseed mustard cultivation through introducing high yielding varieties, proper management practices and crop diversification. Shri A.K. Singh, Member of Governing Body, ICAR raised his concern about import of edible oil with worth of Rs.75000/- crores each year. He stressed upon the need of reducing the import of edible oil and enhancing the farmers income through the technological interventions. He further emphasized that rapeseed mustard can be a good option for increasing the yield and farmers income along with bee keeping and animal husbandry. Dr. S.K. Jha, ADG (O&P) expressed his satisfaction over the rise in Rapeseed-mustard productivity during the last 30 years which has tripled during this period. He expressed his concern over decreasing area under oilseeds during the last 3 five year plans. He also emphasized cultivation of this important crop in non-traditional areas and to increase the productivity of those states where average productivity is less than national average. Dr. P.K. Rai, Director, ICAR-DRMR, Bharatpur, presented the research highlights, scenario of rapeseed mustard area, production and productivity in India and as well as world. He also presented the ATR. He informed that the overall seasonal weather conditions during the year 2018-19 across the rapeseed mustard production zones were normal and favorable for crop growth and development. He mentioned that 158 strains including 10 of toria, 5 of yellow sarson, 132 of Indian mustard, 10 of gobhi sarson and 01 of taramira were tested in 35 performance evaluation trials at 46 locations across the 6 agro-climatic zones. Dr. Rai informed that 256.32 q of breeder seed of 61 rapeseed mustard varieties against the DAC indent of 84.76 q was produced indicating a surplus availability of 171.61 q. In agronomic trials the crop responded up to 150% RDF in the long term experiment. He appraised the house that in total 2080 FLDs were conducted in 67 districts across the 14 States during the last year. Prof. S.S. Banga, National Professor, PAU, Ludhiana expressed satisfaction on the work done by the Scientists in the rapeseed mustard field as the productivity of Haryana has increased up to 2 t/ha. Further, he emphasized on the need of science based selections and breeding of elite rapeseed mustard lines. He also emphasized upon the novel breeding techniques such as genome sequencing and MAS in rapeseed mustard improvement. He showed his concern over the narrow genetic base and the genetic duplicates in the development of rapeseed mustard varieties. Dr. R.S. Kureel, VC, BAU, Ranchi gave a brief account of the research and development in oilseeds at BAU. He emphasized that India is importing 15 mt edible oils which is third largest commodity after petroleum products and gold. The MSP and import-export policy need to be relooked to increase the area and production in Rapeseed-mustard. He expressed his concern on impart of

inferior quality palm oil which is being imported, refined and adulterated with mustard oil. A quality control and quality research must be emphasized. Dr. Z.A. Haider, Chairman Dept. Plant Breeding and Genetics presented the vote of thanks to the Chair, delegates and University authorities and media persons.

Inaugural session followed by presentation of annual progress report of different disciplines by respective PIs. Dr. K.H. Singh, PI, Plant Breeding & Genetics presented the highlights of the plant breeding programme. A total of 6605 accessions were maintained through appropriate mating system. Forty four new accessions were collected and 849 accessions were evaluated. On the basis of germplasm evaluation, promising donors were identified for different traits. With a view to improve seed yield, earliness, seed size, disease/pest resistance, high temperature tolerance, quality and high oil content, in total 946 crosses were attempted in Indian mustard along with 80 crosses in toria and 36 in yellow sarson. Two mapping populations were advanced for mapping of genes/QTLs for drought tolerance and high oil content. A total of 849 advanced breeding lines including 107 of toria, 47 of yellow sarson and 662 of Indian mustard, 22 of gobhi sarson and 11 of taramira were evaluated. In Indian mustard, 7081 single plants were selected for different traits. In evaluation trials, a total of 153 strains consisting of toria (10) yellow sarson (5), gobhi sarson (10), taramira (1) and Indian mustard (127) were evaluated at 46 locations across the 6 agro-climatic zones of the country. On the basis of superiority for seed/oil yield/earliness/quality over best check, 32 strains comprising toria (01), gobhi sarson (07) and Indian mustard (24) were promoted for advanced stage evaluation. Dr. A. K. Pradhan emphasized that results and recommendations should come from evaluation of germplasm so it can be further used for breeding purpose.

Dr. O.P. Premi, PI, Agronomy presented progress report of Agronomy. Six experiments on various crop production aspects of Rapeseed-mustard were conducted at 23 cooperating centres across 5 zones. In Long term fertility experiments on 8th year, crop responded up to 50% higher dose of NPK in Zone I & V and balanced fertilizer application with supplementary use of fertilizers and manures in zone II, III and V. In agronomic evaluation of promising entries under saline/alkaline conditions, entry CS 508-1P2 produced 6.9 % higher seed yield than the best check at Karnal centre. Among different cropping systems, green gram-mustard system gave higher seed yield of mustard in Chata, Pantnagar and Morena. On an average, raised bed technique recorded 17.2 & 26.9 % higher seed yield of mustard over conventional and zero tillage practice, respectively. The house expressed concern over infestation of *Orobanche* in Haryana and Rajasthan states and suggested to continue work on this problem.

Dr. Pushp Sharma, PI, Plant Physiology reported that five experiments were conducted to evaluate mustard genotypes from different agro-climatic zones to abiotic stresses while sixth experiment was conducted at three locations to test efficacy of PGR's under rainfed condition. Thirty seven genotypes of Indian mustard (*B. juncea*) were tested for high temperature tolerance at seedling stage, both under field and laboratory conditions. In both, field and laboratory condition two genotypes PM 25 and PM 29 showed tolerance to high temperature at seedling stage. DRMR 2059 was thermo tolerant at seedling and terminal stage. RH 749 holds promise for low light and heat stress. Foliar spray of brassinolide @20 ppm and salicylic acid @200 ppm at Hissar, Kanpur and Ludhiana centers improved seed yield under rainfed condition.

Dr. P.D. Meena, PI, Plant Pathology presented the results of experiments and informed that disease pressure was moderate during the season. He also reported promising resistant/ tolerant sources against various diseases. In Screening of *Brassica* germplasm and breeding materials, 71J0002 of *B. juncea* was found resistant to WR at all six locations. Under Uniform Disease Nursery for major diseases, many genotypes of *B. juncea* showed resistance to WR over the years and will be screened *in vitro* before recommendation for use in the breeding program. In National disease nursery (NDN) for WR, DRMRMJA 35, DRMRIJ 12-26, DRMRIJ 12-39, PDZ-3 of *B. juncea* showed immune reaction to WR at three locations. In NDN for Sclerotinia rot, DRMRSJ-25 and DRMRSJ-22 of *B. juncea* showed resistant reaction to white rust. Under integrated management, seed treatment (ST) with *Trichoderma harzianum* @ 10g/ Kg seed, soil application of *Trichoderma* (1 kg/ 50kg FYM), basal application of zinc sulphate @ 15 kg/ ha+ S (dose location specific)+ boron (10 kg borax/ ha), line sowing 45x20 cm, no irrigation during 25th Dec to 15th Jan was the best in minimizing AB, WR, DM, PM, SR disease in first year of experiment. Dr. A. K. Pradhan suggested that WR resistant sources should be tested in lab and field for allelic relations and to identify any independent loci for white rust resistance. Dr. Archana Anokhe, presented the highlights of entomology and reported moderate to high population development of mustard aphid on different Brassica species during the crop season 2018-19. She also reported some promising entries, which showed resistance/ tolerance to mustard aphid. Losses in seed yield due to insect-pests ranged from as low as 1.8 to as high as 60.9%. Mustard aphid remained active from 6th to 13th SMW with peak during 7th and 11th SMW. Low to moderate population of painted bug (0.7-6.5 bugs/ mrl) was observed from 44th – 47th In the bio-intensive IPM module experiment. Although dimethoate 30 EC @ 1 ml/l was the best treatment, spray of azadirachtin 3000 ppm @ 5 ml/l also controlled the aphid population effectively and has the potential to be incorporated as 1st spray against aphid whenever population crosses economic threshold level. Among new molecules tested, all were found effective in controlling the mustard aphid population, clothianidine 50 WDG @ 0.12 g/l, thiamethoxam 25 WG @ 0.2 g/l and imidacloprid 17.8 SL @ 0.25 ml/l were more effective as compared to dimethoate 30 EC @ 1 ml/l and acetamiprid 20 SP @ 0.1 g/l.

Dr. Anubhuti Sharma, PI, Biochemistry, presented the highlights of Biochemistry and reported that important breeding materials and IVT/AVT quality entries were evaluated at different centres. Among the 15 genotypes analyzed, the oil content ranged from 40.88% in DRMRQ1-16-27 to 35.73% in LES 59. Oil stability index which is the ratio of MUFA: PUFA, ranged from 0.65 in RH-749 to 1.31 for RLC-7. DRMRQ4-7-23, PDZ 11, PDZ 12, LES 54, LES-57, LES 58, LES 59, RLC8, RCH3, RLC7 and RLC 9 had < 2% erucic acid content. Total protein content ranged from 32.59% (71J0002) to 35.92% (LES-58). Total phenol content ranged from 3.47% (PM-29) to 5.16% (DRMRQ1-16-27). Phytic acid content < 2% was reported in RCH-3, PM-29, RCH-1, DRMRQ1-16-27 . Total glucosinolate content < 30 µmol/g of defatted seed meal was reported in RLC 8, RCH 3, RLC 10, RLC 7,RCH 1, DRMRQ 4-7-23, PDZ 11, PDZ 12, DRMRQ 1-16-27, PDZ 1, 71J0002, RLC 3 and RLC 9. β-carotene content > 5 ppm was reported in RLC10, RH (OE) 1705, PM-29, Kranti and 71J0002. Tocopherol content was >160 mg/100g seed in 71J0002, PDZ1, DRMRQ4-7-23, DRMRQ1-16-27 and Kranti.

Dr. Ashok Kumar Sharma, Pr. Scientist, (Ag Extension), ICAR-DRMR, Bharatpur presented the results of 2080 frontline demonstrations (FLDs) on rapeseed-mustard conducted during 2018-19 in 67

districts across 14 states. He reported that Rajasthan had maximum FLDs (533) followed by Manipur (450), Assam (320), Uttar Pradesh (236) and Madhya Pradesh (129). All the demonstrations were conducted under whole package demonstrations in two different situations viz., irrigated (1129) and rainfed (951). The maximum average yield of 2,754 kg/ha from the IP under irrigated conditions was in Haryana followed by Rajasthan (2,443 kg/ha); Punjab (2,093 kg/ha); Gujarat (1,999 kg/ha) and Madhya Pradesh (1,858 kg/ha). The maximum yield gap of 62.7% was recorded in Jammu & Kashmir followed by 60.3% in Odisha; 60.0% in Himachal Pradesh; 37.8% in Uttar Pradesh; 18.8% in Madhya Pradesh and 17.8% in Maharashtra. More than 160 scientists/ personnel associated with rapeseed-mustard research and development in the country participated in this meeting. With the plenary session chaired by Dr. D. K. Yadava, ADG (Seeds) ICAR, the meeting was successfully concluded on 5th August 2019.