Different types of molecular marker systems can be used in the selection of resistant genotypes. In this work, stripe rust resistant genotypes (İzgi2001, Sönmez2001, PI178383) and susceptible genotypes (Aytın98, ES14, Harmankaya99) were used as parents. Accordingly, PI178383 × Harmankaya99, İzgi2001 × ES14, Sönmez2001 × Aytın98, PI178383 × Aytın98 and İzgi2001 × Aytın98 combinations have been created and F_2 individuals were obtained. Bulk segregant analyses were performed on resistant and susceptible parents and their F_2 individuals by using 366 SSR, 190 EST-SSR, 58 ISSR, 96 RGAP, 18 SRAP, 34 AFLP, 124 RAPD, 17 STS, 209 EST derived primers (39 contigs, 92 singletone, 78 RGAP) to find out molecular marker/markers genetically linked with stripe rust disease resistance source. As a result of screening studies, being specified to the different combinations, totally 6 DNA markers genetically linked with stripe rust disease resistance source were identified. These were namely 3 SSR (*Xgwm382*, *Xgwm311*, *Wwmc658*), 2 EST-SSR (*PK54*, *BU099658*) and 1 AFLP (*P-GAC/M-ACG*). On the other hand, the level of genetic diversity of these resistant and susceptible wheat genotypes was measured and compared by several types of PCR-based markers, the highest/lowest similarity and PIC values of the loci were calculated.

Keywords: Stripe rust; DNA marker; *Triticum aestivum* L.; Marker assisted selection; Genetic diversity

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Poster 3.5.19

An efficient propagation system via somatic embryogenesis

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The rapid and significant improvements in the somatic embryogenesis methods allow extensive practical and commercial applications, particularly for *in vitro* clonal micropropagation. We used two-step direct somatic embryogenesis for the mass propagation of Black Carrots. The callus were derived from hypocotyl of aseptic seedlings when transferred to Murashige and Skoog (1962) (MS) solid medium containing 0.1–0.5–1 mg $L^{-1,}$ 2,4-dichlorophenoxyacetic acid (2,4-D), 30 g L^{-1} of sucrose and 8 g L^{-1} of agar for two weeks. The best callus initiation was obtained with 0.5 mg L^{-1}, 2,4-D. The callus were placed on MS solid medium without growth regulator. The regenerated shoots and somatic embryos were developed to plantlets in this medium. The result of our study shows that two-step direct somatic embryogenesis is a useful method for the mass propagation of Black Carrots.

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Poster 3.5.20

The effect of magnetic field on *in vitro* seed germination, seedling growth and shoot regeneration from cotyledon node explants of *Lathyrus chrysanthus* Boiss

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Although there are many reports on the effects of magnetic field treatments on seed germination, plant growth, protein biosynthesis and root development, to our knowledge this is the first study indicating the effect of magnetic field on *in vitro* seed germination, seedling growth and shoot regeneration capacity of cotyledon node explants in *Lathyrus chrysanthus* Boiss. *Lathyrus chrysanthus* seeds of an ecotype (Diyarbakir) found in southeast of Turkey were subjected to magnetic field strength 125 mT for 0, 24, 48 and 72 hours. Then seeds were surface sterilized using 75% commercial bleach (containing 5% sodium hypochlorite) at 35 °C for 15 min with continuous stirring and were then rinsed three times with sdH_2O at the same temperature. Sterilized seeds were shaked in sdH_2O for 6 h to increase the permeability of seed coat and then were germinated on a basal medium of Murashige and Skoog's (MS) mineral salts and vitamins, 3% sucrose, and 0.7% agar in Magenta vessels. All cultures were incubated at 15 ± 1 °C in dark for 5 days, then they were transferred to growth chamber at 24 ± 1 °C under cool white fluorescent light (27 μmol m^{-2} s^{-1}) with a 16 h light/8 h dark photoperiod. Seed germination and seedling growth percentages were recorded 5 and 14 days after culture initiation, whereas seedling and root lengths were noted 28 days after. Cotyledon node explants were excised from 28-day-old seedlings. The highest results regarding *in vitro* seed germination and seedling growth, and regeneration capacity of cotyledon node explants were recorded from 24 h magnetic field treatment.

Keywords: *Lathyrus chrysanthus* Boiss.; Magnetic field; Seedling growth; Shoot regeneration

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Poster 3.5.21

Marker assisted selection for photoperiod insensitive Ppd-D1a allele in winter wheat breeding program

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This study was conducted in Spring Wheat Lab of Montana State University. Marker assisted selection is a useful molecular breeding method to improve the efficiency and precision of conventional plant breeding. The Ppd-D1a allele of 49 lines in F2 generation and the 4 parents Yellowstone, NE01533, Pelsart and Promontory

were determined using microsatellite markers. Breeders can efficiently use this molecular information in their breeding programs by adding and removing photoperiod insensitive Ppd-D1a alleles to their varieties. In hexaploid wheat, photoperiod insensitive Ppd-D1a allele in 2D chromosome causes early flowering in short day length and long day length, avoiding stresses associated with high temperature and water deficit in grain filling stages. This study shows that the parents NE01533, Pelsart, Promontory and the 47 lines in F2 generation have the Ppd-D1a allele while Yellowstone and the remaining lines are photoperiod sensitive.

Keywords: Breeding; Marker assisted selection; Ppd-D1a allele

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Poster 3.5.22

Marker assisted selection for Rht8 and Rht-D1b dwarfing genes in winter wheat breeding program

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Plant height has been shown to reduce from 3.49 to 12.5% for Rht8 and 17 to 24% for Rht-D1b in many studies. Several studies have indicated that yield increases from 3.8 to 12% for Rht8 and 16 to 30% for RhtD1b. Breeders can efficiently use this molecular information in their breeding programs by adding Rht8 and Ppd-D1b alleles. Marker assisted selection is a useful molecular breeding method to improve the efficiency and precision of conventional plant breeding, which are used to determine Rht8 and Ppd-D1b alleles in 49 lines in F2 generation and the 4 parents Yellowstone, NE01533, Pelsart, Promontory. This research was conducted in Spring Wheat Genetic Lab of Montana State University. Presence of the Rht8 dwarfing gene was determined by genotyping alleles at the gwm261R and gwm261L microsatellite markers locus chromosomally linked to Rht8. DF-MR2 detects mutant Rht-D1b dwarfing allele. This research shows that parent NE01533 and 20 lines in F2 generation have Ppd-D1b dwarfing gene while 18 lines in F2 generation have Rht8 dwarfing gene.

Keywords: Breeding; Marker assisted selection; Rht8; Rht-D1b; Dwarfing genes

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Poster 3.5.23

ISSR analysis of perennial ryegrass (*Lolium perenne* L.) genotypes and association study between phenotypes and genotypes

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Plant materials were 40 perennial ryegrass (*Lolium perenne* L.) genotypes, collected from natural vegetation of Ankara. Interests were to obtain molecular characterization of genotypes (via ISSR markers) and association between genotypes and phenotypes (i.e. length of upper internode, plant width, length of spike, number of spikelets, plant height, colour, leaf width, and growth habit).

Marker scores were recorded in a matrix of 1's and 0's to represent presence or absence of dominant bands. Genetic similarities were calculated from the scoring matrix using the simple matching (SM) coefficient. Principal coordinate analysis and cluster analysis were performed. Association analysis performed between phenotypes and dominant marker bands via single point regression analysis with sub-sampling to identify single marker effects on quantitative traits.

A total of 181 polymorphic fragments were scored across 40 genotypes based on 15 ISSR primer combinations. The number of polymorphic fragments per primer combination was 12.06, ranging from 3 to 24. The SM similarity coefficients changed from 0.55 to 0.80 with an overall mean, across all genotype pairs, being 0.68. Out of the 181 bands, 32 of them were designated as loci with rare alleles since one allelic state (present or absent) was present in fewer than three genotypes and excluded in the association analysis. Significant associations found between markers and quantitative traits: length of upper internode, plant width, length of spike, number of spikelets, plant height, colour, leaf width, and growth habit. Experiment wise significance level was set as $P < 0.05$.

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