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| Please use this form to clearly and concisely report on project progress. The information included should reflect quantifiable results that can be used to evaluate and measure project success. Comments should be limited to the designated boxes. Technical reports, no longer than 4 pages, may be attached to this summary report. |
| Project Number: |  |
| Project Title:  | Screening soybean germplasm and breeding soybeans for flood tolerance |
| Organization:  | University of Missouri-Fisher Delta Research Center |
| Principal Investigator Name: | Shannon Grover, PhD |
| Other investigators: | Drs. Francia Ravelombola, Chengjun Wu, Caio Vieira, Tessie Wilkerson, and David Moseley |
| Report Period: | December 16, 2022 to March 15, 2023 |
| Project Status: On-going(What key activities were undertaken and what were the key accomplishments during this quarter? Please use this field to clearly and concisely report on project progress).  |
| **Missouri:****1. Evaluation of breeding lines for flooding tolerance and yield to develop commercial varieties.****i) Advanced yield trials**: A total of 20 MG4, and 22 MG5 will be evaluated along for flooding tolerance and yield. The test lines include selections of lines with stable flood damage score and potential high yielding lines from 2022-2021 flood advanced yield trials, 2022 preliminary yield trials and elite breeding lines that are included in the 2023 USDA soybean Uniform Test. One tolerant check, one flood sensitive check and commercial varieties have also been included the group 4 and group 5 tests. The tests will be planted in 4-row plots with 3 replications under both flooding stress (V2 and R1) and non-stress (non-flooded field) conditions. **ii) Preliminary yield trial:** A total 23 MG4 breeding lines selected from 2022 progeny rows (derived from 6 crosses) will be evaluated for flooding tolerance and yield. The test also includes one tolerant check, one susceptible check and 3 commercial checks. The test entries will be planted in 4-row plots in 2 replications in flooded (V2 and R1) and non-flooded fields. **2. Yield evaluation of selected tolerant and sensitive lines in flooded and non-flooded field:** The objective of this test is to evaluate effects of flooding stress on seed yield, seed composition and seed quality. A set of 15 tolerant and 15 sensitive lines for flood from MO, AR and NC, will be evaluated for flood tolerance and yield under flooded (R1/R2 stage) and non- flooded conditions during the summer of 2023. The test entries will be planted in 12’ 4-row plots in 3 replications. **3. Screening of recently developed elite lines for flood tolerance:** A set of96 breeding lines, recently developed at the University of Missouri - FDREEC and at the University of Arkansas and six checks (5 commercial cultivars and one sensitive line) will be included in the screening test. These lines will be planted in 7’ single-row plots in 3 replications. The test entries will be subjected to flooding stress at R1/R2 stage. Seed is being packaged for this test**4. Missouri commercial variety testing for flood tolerance:** We will evaluate 46 MG4 and MG5 commercial varieties developed by 13 different seed companies in single 7-ft long row plots with 3 replications under flooding stress for at R1/R2 stage during the summer of 2023 at the Lee Farm Portageville, MO. **5. Progeny rows:** About 400 new breeding lines derived from drought tolerant crosses will be grown in single progeny rows in the 2023 season. Individual F4 plants are in the process of being harvested in the off-season nursery and will be processed for planting this summer.**6. Breeding populations advancement:** Four new crosses between flood tolerant soybeans and elite high-yield breeding lines were made in 2022. The F1 seeds of these crosses have been sent to the winter nurseries where the populations will be advanced to F4 for testing in 2024.**7. New crosses:** About 4-5 new crosses between flood tolerant PIs/lines and elite breeding lines will be made with a view to develop new high-yielding flood tolerant varieties. Four lines S17-1494, S19-17693, S20-24521 and S20-24524 showed the most consistent tolerance across locations and will be used as parents in 2023 crosses**MSSB flood tolerance tests across states – Missouri:** Francia Ravelombola and Michael Clubb; **Arkansas:** Chengjun Wu; **Mississippi:** Tessie Wilkerson; and **Louisiana: David Moseley.** Eighty-eight group IV and V lines (48 from Missouri and 40 from Arkansas are listed along with 12 checks in the table below. They will be screened to flooding stress and scored for damage in each of the four states as follows:

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| **Source** | **Entry** | **Name** | **Notes** |
| MO | 1 | S12-1362 | Tolerant |
| MO | 2 | S17-1146 | Tolerant |
| MO | 3 | S17-1494 | Tolerant and Consistent across locations in 2022 tests |
| MO | 4 | S17-17644 |  |
| MO | 5 | S18-3722 |  |
| MO | 6 | S18-6013 |  |
| MO | 7 | S18-6328 |  |
| MO | 8 | S18-9258 |  |
| MO | 9 | S19-10701 |  |
| MO | 10 | S19-1176 |  |
| MO | 11 | S19-12409 |  |
| MO | 12 | S19-12459 |  |
| MO | 13 | S19-12537 |  |
| MO | 14 | S19-14058 |  |
| MO | 15 | S19-14284 |  |
| MO | 16 | S19-14307 |  |
| MO | 17 | S19-14797 |  |
| MO | 18 | S19-17313 | Tolerant |
| MO | 19 | S19-17667 | Tolerant |
| MO | 20 | S19-17693 | Tolerant and Consistent across locations in 2022 tests |
| MO | 21 | S19-17893 |  |
| MO | 22 | S19-18135 |  |
| MO | 23 | S19-19741 |  |
| MO | 24 | S19-19764 |  |
| MO | 25 | S19-19923 |  |
| MO | 26 | S19-2082 |  |
| MO | 27 | S19-7867 |  |
| MO | 28 | S20-12454 |  |
| MO | 29 | S20-13179 |  |
| MO | 30 | S20-13444 |  |
| MO | 31 | S20-14129 |  |
| MO | 32 | S20-1435 |  |
| MO | 33 | S20-1492 |  |
| MO | 34 | S20-14936 |  |
| MO | 35 | S20-15411 |  |
| MO | 36 | S20-17501 |  |
| MO | 37 | S20-17527 |  |
| MO | 38 | S20-18805 |  |
| MO | 39 | S20-2227 |  |
| MO | 40 | S20-24521 | Tolerant and Consistent across locations in 2022 tests |
| MO | 41 | S20-24524 | Tolerant and Consistent across locations in 2022 tests |
| MO | 42 | S20-4428 |  |
| MO | 43 | S20-5669 |  |
| MO | 44 | S20-7117 |  |
| MO | 45 | S21-21170 |  |
| MO | 46 | S21-21192 |  |
| MO | 47 | S21-4926 |  |
| MO | 48 | S21-4942 |  |
| MO | 49 | S99-2281 | Susceptible |
| AR | 50 | R19C-1035 |  |
| AR | 51 | R19C-1081 |  |
| AR | 52 | R19C-1001 |  |
| AR | 53 | R19-39415 |  |
| AR | 54 | R19C-2678 |  |
| AR | 55 | R19C-3147 |  |
| AR | 56 | R18C-13665 |  |
| AR | 57 | R19-39444 |  |
| AR | 58 | R19-411424 |  |
| AR | 59 | R19-42447b |  |
| AR | 60 | R19-4593 |  |
| AR | 61 | R19-424115b |  |
| AR | 62 | R19-46252 |  |
| AR | 63 | R19-410712 |  |
| AR | 64 | R19-45980 |  |
| AR | 65 | R19-43217 |  |
| AR | 66 | R19-42848 |  |
| AR | 67 | R18CR-83 |  |
| AR | 68 | R18CR-144 |  |
| AR | 69 | R18CR-328 |  |
| AR | 70 | R18-10491 |  |
| AR | 71 | R19C-3194 |  |
| AR | 72 | R19C-3085 |  |
| AR | 73 | R18-10919 |  |
| AR | 74 | R18CR-461 |  |
| AR | 75 | R18CR-287 |  |
| AR | 76 | R18CR-80 |  |
| AR | 77 | R18-67F |  |
| AR | 78 | R18-11839 |  |
| AR | 79 | R18-9794 |  |
| AR | 80 | R11-6870 | Tolerant |
| AR | 81 | R18-14147 |  |
| AR | 82 | R14-1422 |  |
| AR | 83 | R18-14502 |  |
| AR | 84 | R18-11770 |  |
| AR | 85 | R16-45 | Tolerant |
| AR | 86 | R18-9782 |  |
| AR | 87 | R18-14272 |  |
| AR | 88 | R19C-1012 |  |
| AR | 89 | P42A84E | Commercial check |
| AR | 90 | AG43XF2 | Commercial check |
| AR | 91 | AG48X9 | Commercial check |
| AR | 92 | S49-F5X | Commercial check |
| AR | 93 | NK45-V9E3 | Commercial check |
| AR | 94 | AG52XF0 | Commercial check |
| AR | 95 | AG54XF0 | Commercial check |
| AR | 96 | AG56XF2 | Commercial check |
| AR | 97 | P48A14E | Commercial check |
| AR | 98 | P40A16E | Commercial check |

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