

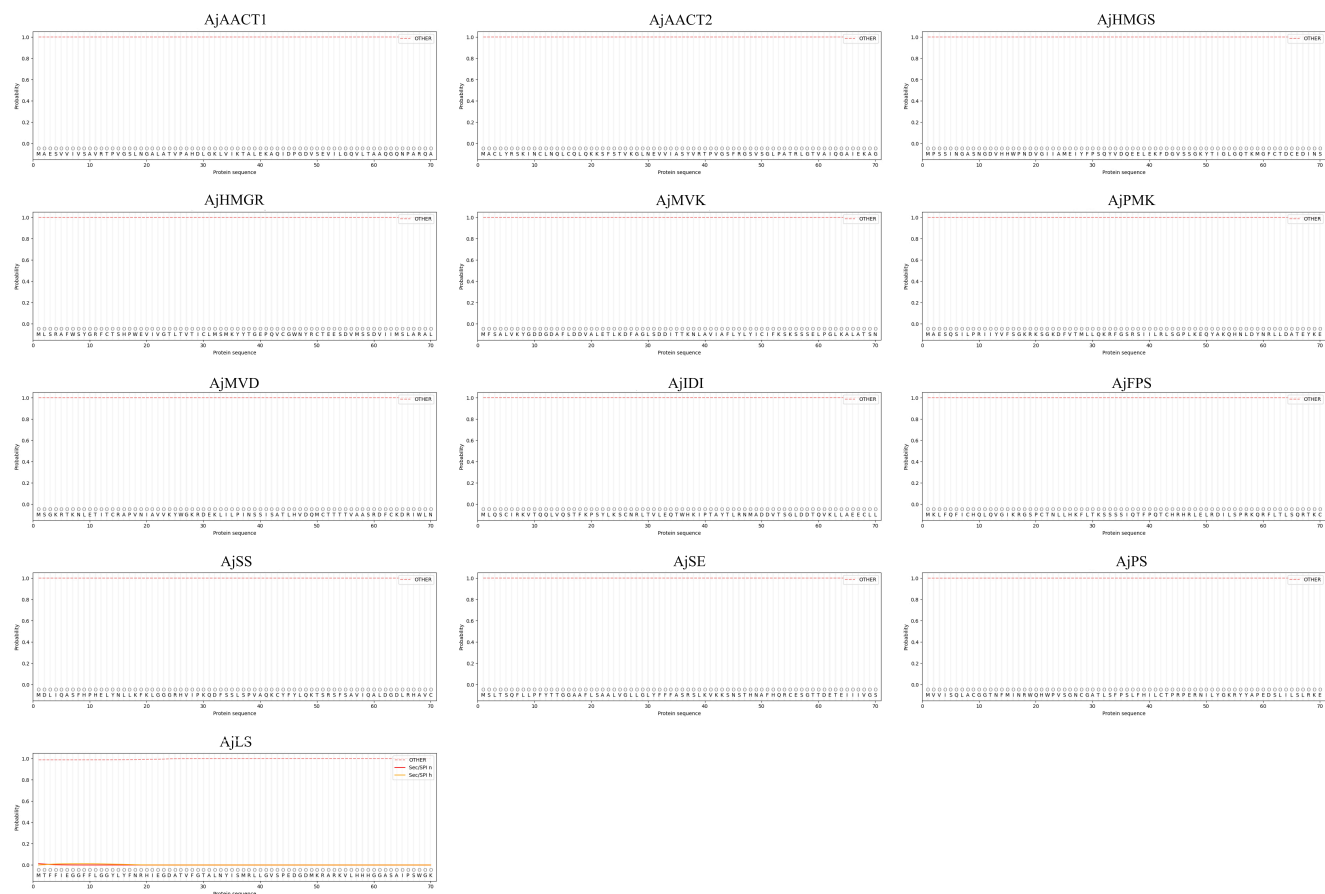


**Figure S1.** Signal peptides predictions of candidate genes responsible for saponin biosynthesis through the SignalP-6.0 server.

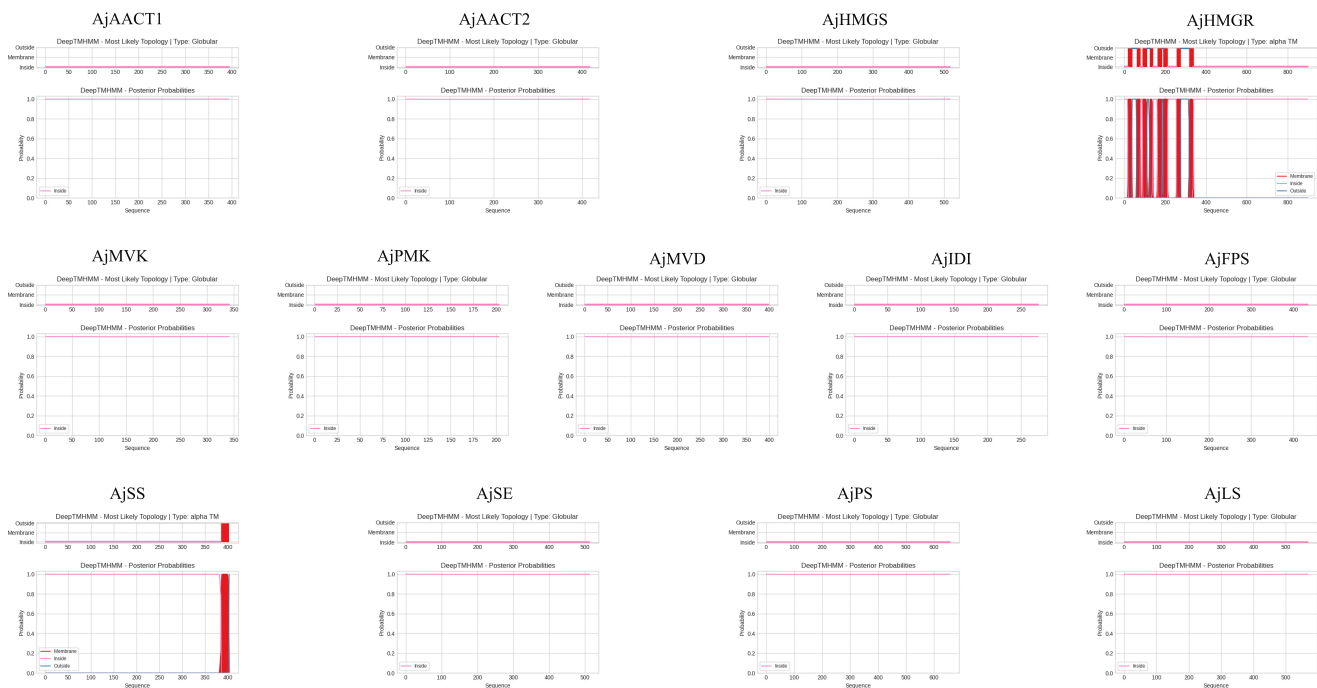


**Figure S2.** Transmembrane domain predictions of candidate genes responsible for saponin biosynthesis through the DeepTMHMM-1.0.

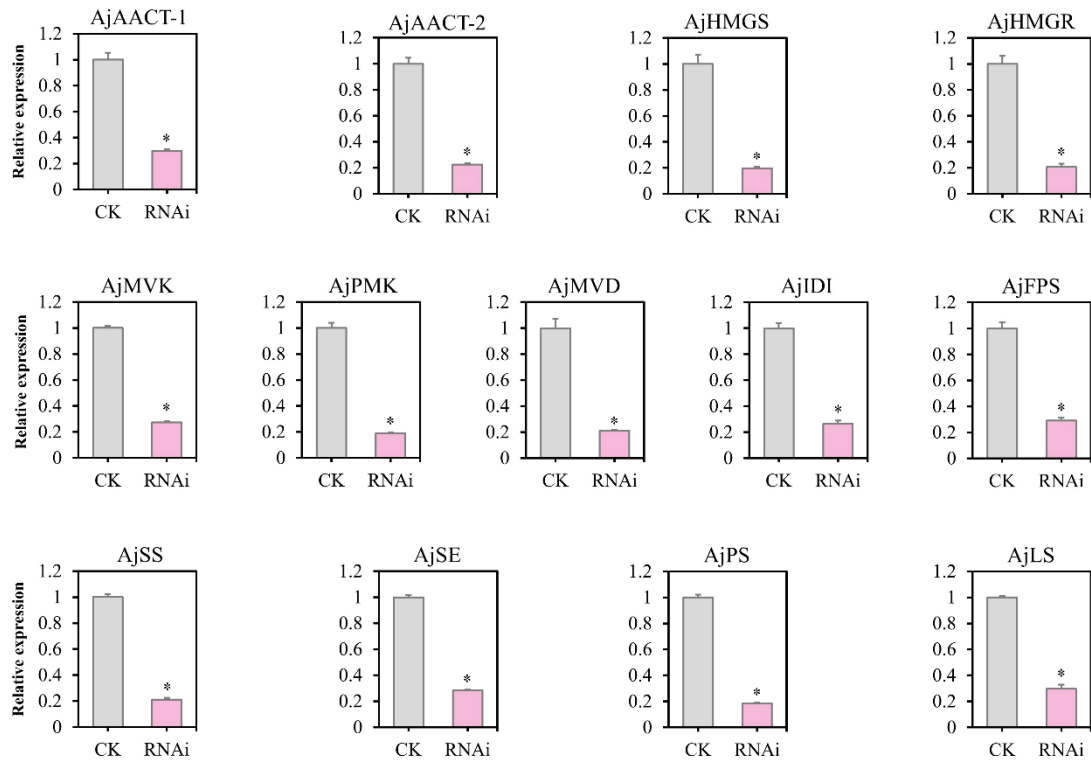


**Figure S3.** Relative expression levels after knockdowns of candidate genes responsible for saponin biosynthesis;  $*p < 0.05$ , significantly different as compared with the control group (CK, sterile seawater injection); RNAi, the RNA interference group (siRNA injection).

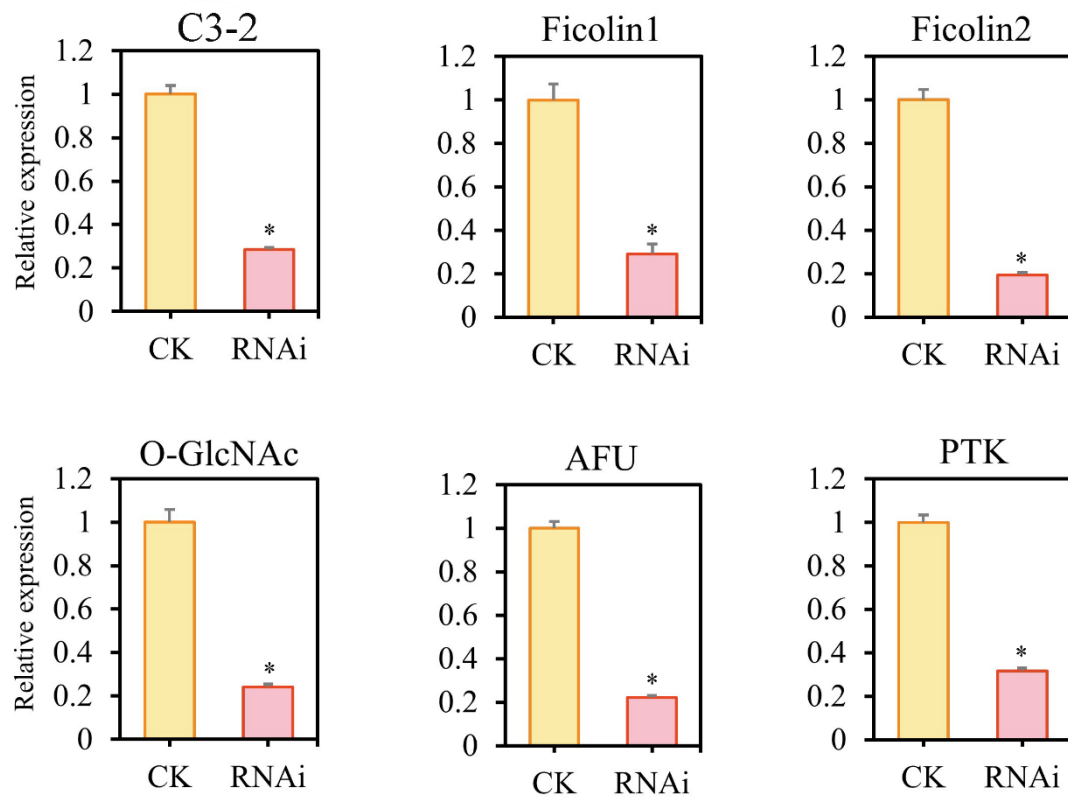


**Figure S4.** Relative expression levels after knockdowns of the identified factors;  $*p<0.05$ , significantly different as compared with the control group (CK, sterile seawater injection); RNAi, the RNA interference group (siRNA injection).

**Table S1** The primer sequences for RACE used in this study

| Primer name | Sequence (5'–3')              | Sequence source                 |
|-------------|-------------------------------|---------------------------------|
| AjAACT-1-3I | TGTAGTTGCTTGGGCACAGGCAGGAGTA  | Designed in this study          |
| AjAACT-1-3O | GAGGAGTGAGTTCAGGTTTGGGGACAGC  | Designed in this study          |
| AjAACT-1-5I | TGCTGTAAGTACCTGACCCAAAATAACC  | Designed in this study          |
| AjAACT-1-5O | TGGTGTCTAGCCCTCTTTTGTCTGCCTCT | Designed in this study          |
| AjAACT-2-3I | ATTAGCCAACATCAAACCTCCTCGGTCTC | Designed in this study          |
| AjAACT-2-3O | AATGTGGAGCCGTTAGCCAGGGTTGTCA  | Designed in this study          |
| AjAACT-2-5I | CCCTGGCTAACGGCTCCACATTCAACCT  | Designed in this study          |
| AjAACT-2-5O | AGCAATGGGGAACCTCTATGGGAGCGACA | Designed in this study          |
| AjHMGS-3O   | GCTATTCCTTGGTACTTGGTATCTCACG  | Designed in this study          |
| AjHMGS-5I   | AGCCCCAAGGTAGCACTGGATGGAAAGT  | Designed in this study          |
| AjHMGR-3I   | CTTGTTGGTTCAGCAATGGCAGGTAGC   | Designed in this study          |
| AjHMGR-3O   | ACATCTGTTTCCTGAGGTTTCAATCGGTG | Designed in this study          |
| AjHMGR-5I   | TGGCGTCTCCTGTCACCGATTGAAACCT  | Designed in this study          |
| AjMVK-3I    | AGATAATGCCGTCAGCGTGTCCG       | Designed in this study          |
| AjMVK-3O    | TGGCGGCGGGACTTCTTCTAGT        | Designed in this study          |
| AjMVK-5I    | CAGACTGGGCATTTTCGTCCAACGGTTCA | Designed in this study          |
| AjMVK-5O    | TGTCTCTCACTCCAGCTACCAGCACCTT  | Designed in this study          |
| AjPMK-3I    | AGAGGATTAGTGCCACGAAAGGT       | Designed in previous study [28] |
| AjPMK-3O    | AGGAGCAGCACAGGGCAGCTATGA      | Designed in previous study [28] |
| AjPMK-5I    | TTGTCGAGTCCACACTCTGACGGAGCAT  | Designed in previous study [28] |
| AjPMK-5O    | CCCACACCTTCTCTGTCTCTCTGCCAT   | Designed in previous study [28] |
| AjMVD-3I    | AGGTTTGCCATCGGAGAGTAACCA      | Designed in this study          |
| AjMVD-3O    | CTCCTGGTCTATCGTGAGGCTCGT      | Designed in this study          |

|          |                                |                                 |
|----------|--------------------------------|---------------------------------|
| AjMVD-5I | GGTCATCTCTTGAGCTCCAGGACCAACC   | Designed in this study          |
| AjMVD-5O | TCCCCTTCCCCCTCCGATATAGTCCACA   | Designed in this study          |
| AjIDI-3I | TCCCCTTCCCCCTCCGATATAGTCCACA   | Designed in this study          |
| AjIDI-3O | TCGGGTGAAACTGTTAGCTGACGAATGT   | Designed in this study          |
| AjIDI-5I | TCGGGTGAAACTGTTAGCTGACGAATGT   | Designed in this study          |
| AjIDI-5O | TGGGCTCTGGATTACCATCACGTCTTT    | Designed in this study          |
| AjFPS-3I | CGTCCCACATGGAAAGCGAAACAGAGGC   | Designed in previous study [29] |
| AjFPS-3O | TGAGGAGGAGGCCAGTAAAGATGCTGCA   | Designed in previous study [29] |
| AjFPS-5I | GCCTCTGTTTCGCTTCCATGTGGGACG    | Designed in previous study [29] |
| AjFPS-5O | AGCAGCTCCACACACCATCCTAACACCA   | Designed in previous study [29] |
| AjSS-3I  | TACCAAGAGCAACGAGAAAGATAAAGCC   | Designed in this study          |
| AjSS-3O  | TCCTTCCATCCTCACGAACTCTACAATC   | Designed in this study          |
| AjSS-5   | GAGCGGAACTTTCTCTTCGTTGGGAATGGT | Designed in this study          |
| AjSE-3   | ATCGCTGGTGGAAGGCATTGTGGGTAGAGT | Designed in this study          |
| AjSE-5   | CGTAAACTCTCGTCAACACCAAACCGC    | Designed in this study          |