

LIST OF FIGURE

Title	Page
Figure (1) Phenylpropanoid and monolignothetic pathways. The grey box represents the phenylpropanoid and monolignolbiosynthetic pathways that are generally accepted for angiosperms with indication of the 20 mutant alleles studied (in red). The generalphenylpropanoid pathway starts with PAL and ends with CCOAOMT, whereas the monolignol-specific biosynthesis starts with CCR	49
Figure (2) Partial diagram of the monolignol pathway in angiosperms. Bolder structures and large-diameter arrows represent preferred pathways as recently clarified (53–55). Thebm1mutation affects the cinnamyl alcohol dehydrogenase (CAD) enzyme activity, and thebm3mutation affects the caffeic O-methyltransferase (COMT) enzyme activity	54
Figure (3) Schematic drawing of the plasmid pZMAS COMT (10.907 bp)	59
Figure (4) The structure of the Biolistic (Gene Gun)	60
Figure (5) The Process of the Biolistic (Gene Gun)	61
Figure (6) the number of alive and dead calluses after six selections on N6E medium for variety SD7	68
Figure (7) the number of alive and dead calluses after six selections on N6E medium for variety SD34	69
Figure (8) The different growth stages for embryo cultured on medium D and N6E on variety SD7 (Right) and SD34 (Left) as follow: (1) planting of immature embryo; (2) embryo growth and forming; (3); Alive and dead callus (4) callus induction and (5) sub-culture of callus.	71
Figure (9) different values of dead and a live callus during the three reading	73
Figure (10) Overall values of dead and a live callus for SD7 and SD 34 inbreed lines	74