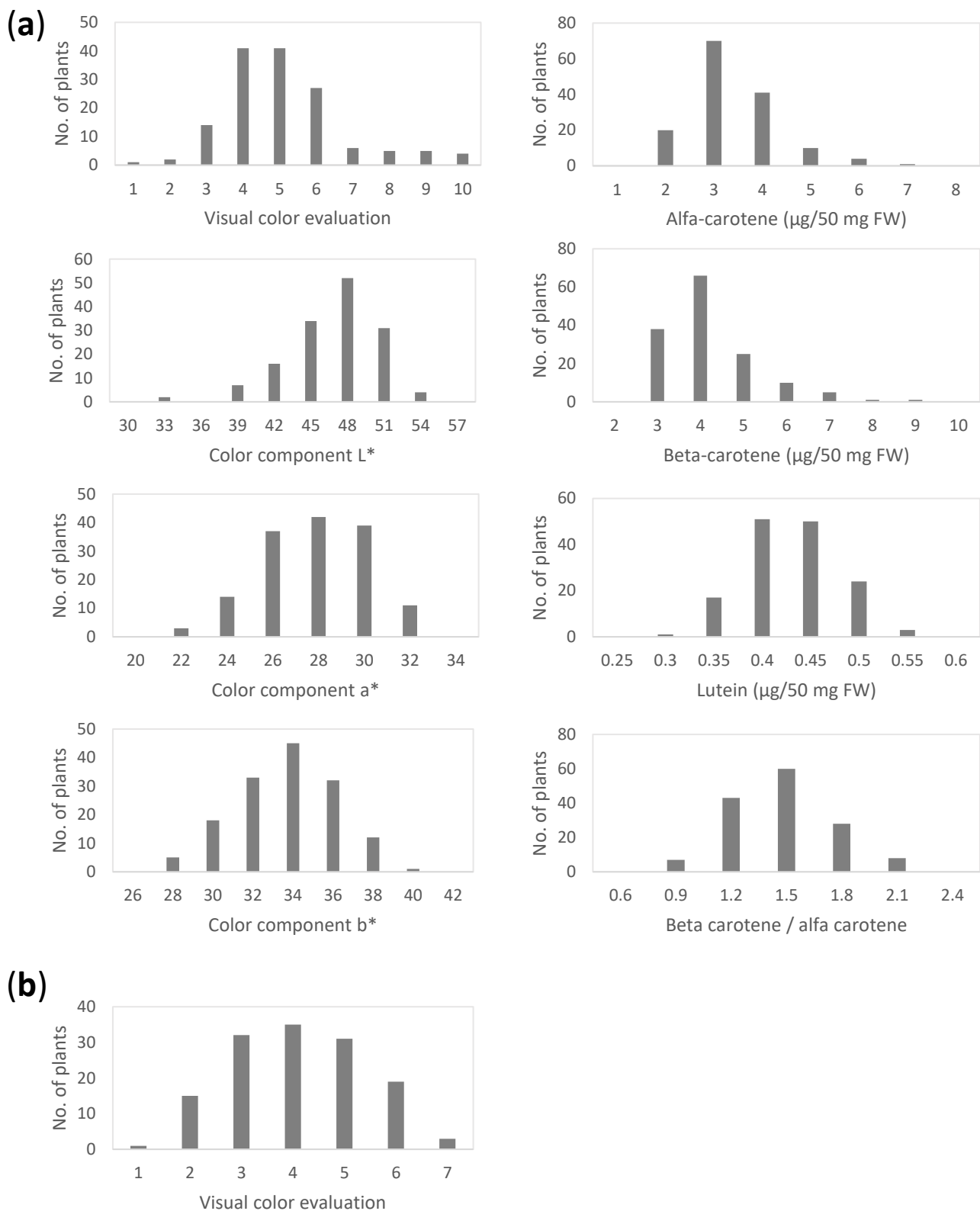
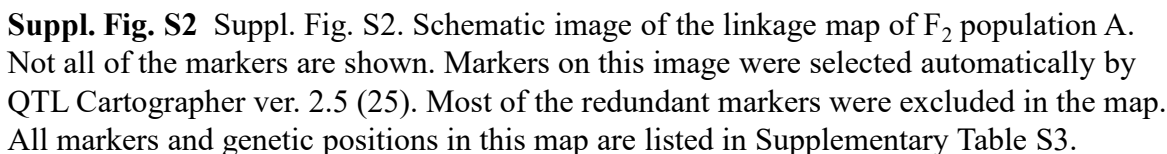
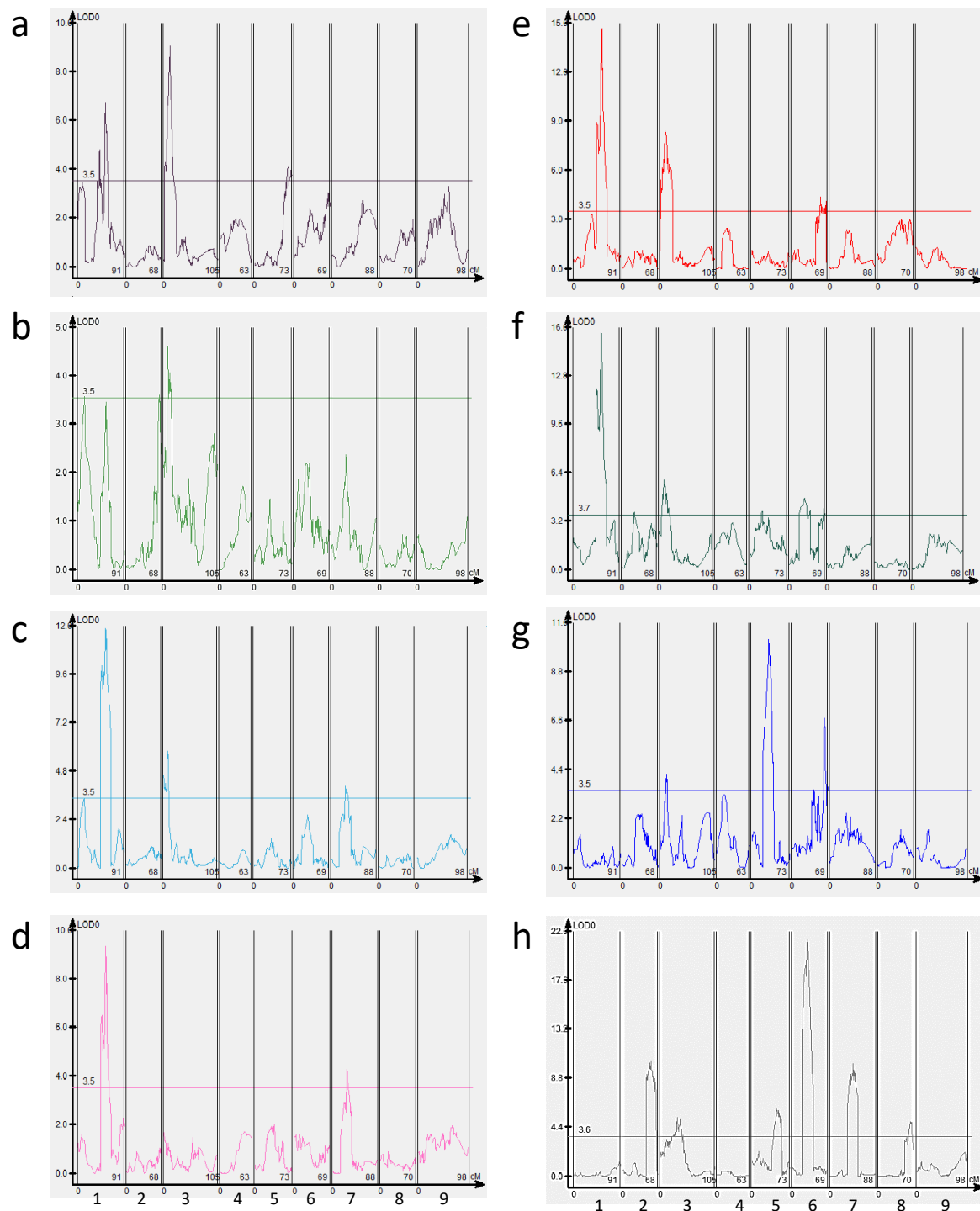


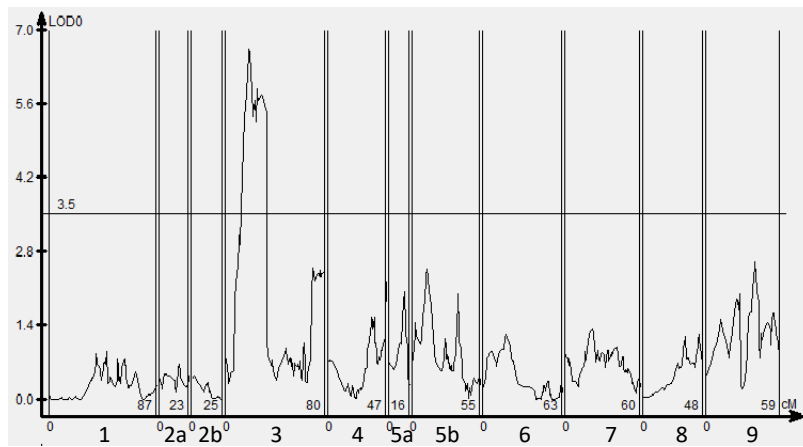


Suppl. Fig. S1. The frequency distributions of carrot root color in F₂ population A **(a)** and F₂ population B **(b)**. In F₂ population A, roots were visually evaluated, and color components (L*, a*, and b*) and α - and β -carotene contents were examined (a). In F₂ population B, roots were only visually evaluated (b). In the visual color evaluation, root color was categorized in ten grades (1: light orange to 10: dark orange) in F₂ population A (a) and seven grades (1: light to 7: dark orange) in F₂ population B (b).

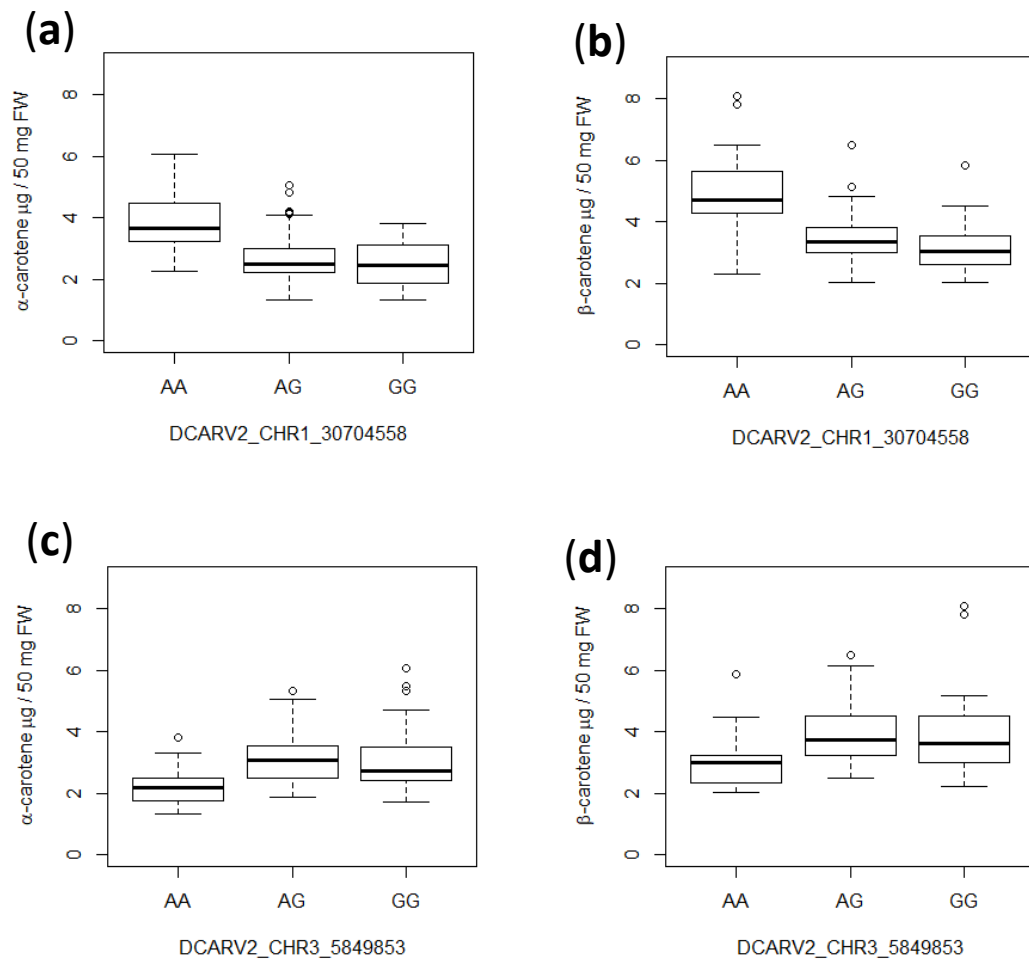




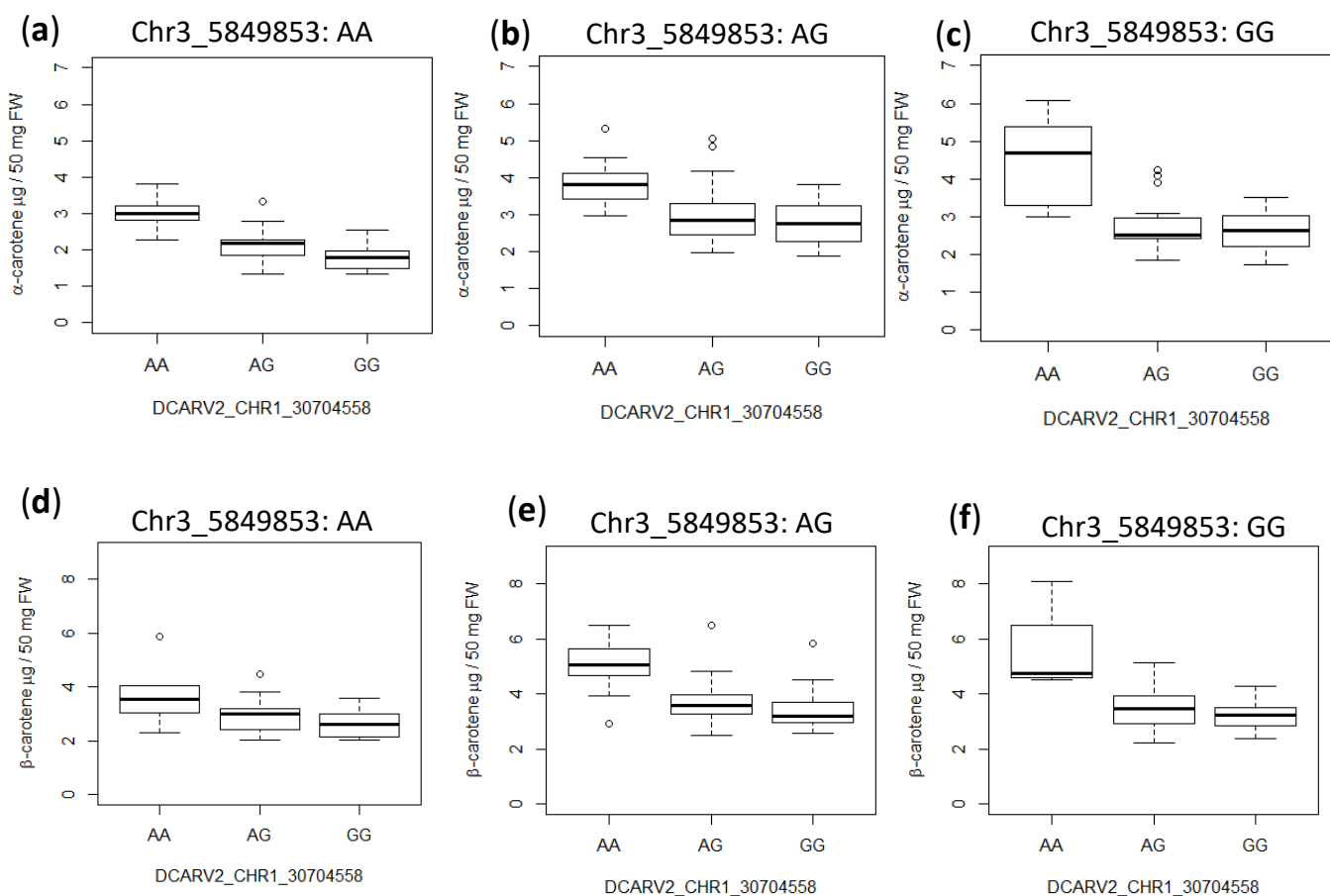
Suppl. Fig. S4. Log likelihood (LOD) in the QTL analysis of F_2 population A for nine carrot chromosomes. A threshold to declare a putative QTL is indicated by the *horizontal line*. The threshold values for LOD scores were determined from 1,000 permutation tests. **a:** Visual evaluation, **b:** L^* , **c:** a^* , **d:** b^* , **e:** α -carotene content, **f:** β -carotene content, **g:** lutein content, **h:** the β/α -carotene ratio.



Suppl. Fig. S5. QTL for the visual evaluation of carrot taproot color in F_2 population B. LOD for carrot chromosomes and linkage groups. A threshold to declare a putative QTL is indicated by the *horizontal line*. The threshold values for LOD score were determined from 1,000 permutation tests.



Suppl. Fig. S6. Allelic effects of associations detected by the GWAS on chromosome 1 (**a**, **b**) and chromosome 3 (**c**, **d**) for the α -carotene (**a**, **c**) and β -carotene (**b**, **d**) content in carrot root surface. Carotene contents were box-plotted by the SNP showing the highest $-\log_{10}P$ in the GWAS for α -carotene content. The numbers of plants were 30, 81, and 34 for the AA, AG, and GG SNPs respectively in panels **a** and **b**, and 40, 70, 35 for the AA, AG, and GG SNPs respectively in panels **c** and **d**.



Suppl. Fig. S7. Examination of allelic interactions between associations detected by GWAS on chromosomes 1 and 3 for the α -carotene (a–c) and β -carotene (d–f) content in carrot root surface. Carotene contents were box-plotted by the SNP showing the highest $-\log_{10}P$ in the GWAS for the α -carotene content on the chromosomes 1 and 3. The SNPs of chromosome 3 at physical position 5,849,853 were AA (a, d), AG (b, e), and GG (c, f).