Introduction

*Quercus mongolica* var. *crispula* is one of the major components of deciduous forests in East Asia and widely distributed in Japanese Archipelago. cpDNA studies supported a strong population structure between the northern and southern populations and a recent population history for the northern Japan populations. It is likely that the populations have evolved divergently and adapted to different local environments in the two regions. In an effort to investigate molecular adaptive evolution of *Quercus mongolica* var. *crispula* in Japan, we characterized genetic variation patterns of methionine synthase gene.

Material and Method

61 unique individuals collected from 16 populations sampled from throughout species-wide distribution (eight from northern (33 individuals) and eight from southern (28 individuals) populations were cloned (TOPO vector, Invitrogen) and sequenced for the methionine synthase gene. 180 individuals from 18 populations distributing in six different latitudinal ranges (31-32; 33-34; 35-36; 37-38; 40-41; 42-43 degrees N) were used for examining the frequency of individual SNPs in exons 2 and 3.

3. Result and Discussion

We found evidences for recent positive selection of the methionine synthase gene: In the exons 2 and 3, nucleotide diversity (Watterson 1975) was higher at nonsynonymous sites than at synonymous sites (*a/s = 2.48*); A negative value of Tajima’s test (- 1.02, *P > 0.05*) is also consistent with the possibility of recent positive selection (Wright and Gaut, 2005); All the four nonsynonymous substitutions, A158G, G184A, C169G, and A956G (Figure 1) may have recently occurred and accumulated in northern populations, probably shortly after their establishment in northern Hokkaido, around 8000-12 000 years ago. Significant clinal variation were observed for the wo SNPs (A158G and G184A). We argued that the clines result from the interplay of natural selection & isolation-by-distance (IBD) effect.

Figure 1 Frequency distribution of four SNPs examined in exons 2 and 3

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