Indole producing reaction is a crux in the regulation of metabolite flow through the pathways and the coordination of primary and secondary product biosynthesis in plants. Indole is yielded transiently from indole-3-glycerol phosphate and immediately condensed with serine to give tryptophan, by the enzyme tryptophan synthase (TS). There is evidence that plant TS, like the bacterial complex, functions as an a b heteromer. In few species, e.g. maize, are known enzymes, related with the TS α-subunit (TSA), able to catalyse reaction producing indole, which is free to enter in secondary metabolite pathways. In this contest, we searched for TSA and TSA related genes in Isatis tinctoria, a species producing the natural blue dye indigo. The It-TSA cDNA and the full-length exons/introns genomic region were isolated. The phylogenetic analysis indicates that It-TSA is closer related to Arabidopsis thaliana At-T14E10.210 TSA (95.7% identity at the amino acid level) with respect to A. thaliana At-T10P11.11 TSA1-like (63%), Zea mays indole-3-glycerol phosphate lyase (54%), Z. mays TSA-like (53%), and Z. mays indole synthase (50%). To examine the involvement of It-TSA in the biosynthesis of secondary metabolism compounds, It-TSA expression was tested in seedling grown under different light conditions. Semi-quantitative RT-PCR performed showed an increase in the steady-state level of It-TSA mRNA, paralleled by an increase of indigo and its precursor isatan B. Our results appear to indicate an involvement for It-TSA in indigo precursor synthesis and/or tryptophan biosynthesis.