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Genetic control of ovule number per pod and its relationship with leaflet morphology in soybean

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Soybean ordinarily has one to four ovules per pod, and occasionally five-ovuled pods are observed. The number of ovules per pod (NOP) differs among genotypes, and a relationship has been suggested to exist between the NOP and leaflet morphology. In this study, we defined four major QTLs for NOP using a recombinant inbred population derived from a high NOP landrace and an ordinary cultivar and investigated the effects of the NOP QTLs on leaflet shape. At three of these QTLs, the high NOP landrace had positive effect alleles. QTLs detected on chromosomes 8 and 13 (qNOP8-1 and qNOP13-1, respectively) corroborated previous reports, but the other QTLs (qNOP3-1 and qNOP4-1) were novel. Accumulation of the positive effect alleles at these QTLs resulted in high NOP and the elite lines exceeding the high NOP landrace appeared. The impact of the QTLs on the NOP did not correspond completely to those on the fraction of four- and five-ovuled pods, indicating the presence of multiple NOP regulation mechanisms. Most of the major NOP QTLs did not affect leaflet shape traits including the ratio of leaflet length to width and leaflet circularity. The *Ln* was identified as a gene controlling both the NOP and leaflet shape, but most of the QTLs detected in the present study are likely involved in different NOP control mechanism from the *Ln*. Isolation of the genetic factors would help us to understand the genetic and morphogenetic basis of the NOP.