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Gender identification in dioecious *Populus ciliata* using molecular and morphological markers

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Gender in a dioecious tree species is generally identified at reproductive phase. In case nursery growers are able to know the gender at early stage of growth (seedling stage) it will be economically beneficial. The present investigations are undertaken verifying this fact in view and *Populus ciliata* was taken as first plant. It is hypothesized that in plants where the sex chromosomes are not identified, there may be a region in the genome or DNA of the tree which may influence the gender of the plant. RAPD markers were used as a tool of study along with variation in leaf morphological characters between male and female mature trees. Out of ten polymorphic random primers used, one primer (OPK-20) gave significant difference between male and female trees and identified as female specific marker (OPK-20_{400}, OPK-20_{500} and OPK-20_{800}). This marker is distinct to determine the sex of *P. ciliata* at an early stage. The qualitative traits (i.e., shape of base and tip of leaf blade, sinus with petiole, pubescence on the lower surface of the leaf blade, leaf margin and colour of the blade) and quantitative traits (i.e., LA, L/W%, P/N%, perimeter, aspect ratio and shape factor) in male and female tree showed that three qualitative characters (shape of base of leaf blade, sinus with petiole and leaf margin) were distinct in male and female trees. The quantitative parameters, except the shape factor showed non-significant differences. It is concluded that qualitative differences exists between the two genders in *P. ciliata* besides the specific marker.

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Unraveling the molecular mechanism underlying disorders of sex development

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Disorders of Sex Development (DSD) are conditions with diverse pathophysiology in which development of 'gonadal sex' is divergent. Albeit DSD has been studied widely, diagnosis remains still undefined in over 50% of patients with 46, XY DSD. Many epidemiological and animal studies have suspected environment endocrine disrupting chemicals to be involved in DSD. Therefore, we hypothesize that a significant number of DSD are caused by the combination of genetic variants and endocrine disruptors. Androgenic compounds work by binding to androgen receptors, which further bind to androgen response elements (ARE) and switch on specific genes. We have generated several transgenic zebrafish lines in which five-tandem AREs drive expression of YFP. Thus, validate the use of zebrafish as *in vivo* biosensor model for testing disruption of androgen action due to exposure to EDCs and therefore a possible cause for 46 XY DSD. In this study, response of 5XARE: YFP construct was studied *in vitro* and *in vivo*. *In vitro* results confirmed that construct is responsive to human androgen receptor, however, efficiency of zebrafish androgen receptor to bind human androgen response element awaits future. The *in vivo* response of construct cannot be assessed as random increase and decrease in YFP expression was observed after exposure to anti-androgen and androgen ligands. This variability is likely either due to multiple insertions within individual lines or time point at which treatments were performed. However, repeat experiments are required to confirm this finding. In future, embryos having YFP expression in androgen responsive tissue will be selected, out crossed with wild type and treated within 24 hours post fertilization.

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