Abstract

The objectives of this study were to research and develop inbred lines of hemp. There were 4 experiments consist of; (1) production and evaluation of S3 lines (2) developing SCAR markers for sex determination for hemp breeding program (3) relationship between DNA markers and THC content and percent fiber traits, (4) classification of hemp lines into different flowering groups.

For Experiment 1, 53 S_2 lines were grown, sib mating and 266 S_3 lines were harvested. The S_2 generation showed large range of segregation in all agronomic characters. Large phenotypic diversities were found, both within and between lines. Significant positive correlation coefficients were found between all agronomic characters except fiber content. Two hundred S_3 lines were selected and sown. Lines will be harvested at early August and to be evaluated further.

For Experiment 2, twenty SCAR markers were tested to amplify the DNA of 10 female plants and 10 male plants. The results showed that only one out of 20 SCAR markers could amplify male plants DNA not female plants. The SCAR marker is P5_1.

Experiment 3 aims to screen the SSR markers for studying relationship between DNA markers and THC content and percent fiber traits, 50 SSR markers were used to generate DNA fingerprint. The result showed that the three markers – Cs303 and Cs304 showed DNA polymorphism between 8 lines of high and 8 lines of low fiber content. While all 50 SSR markers show monomorphic between high and low THC content. Furthermore, we used DNA marker that use to identify drug and fiber types of *Cannabis* we found that all the hemp samples in this study showed fiber type DNA pattern which consistent with the THC content of all samples are low as 0.3%.

In Experiment 4, two hundred selected hemp lines were sown. Different flowering patterns within lines were found. Most lines (71%) contained both male and female plants with flowering. The 29% of lines had either only male or female plants at flowering within line. Lines were classified as compared with the standard check varieties into four groups. Group 1 and 2 flower about 60-90 days earlier than checks and accounted for 20%. Most lines (80%) were placed into group 3 and 4 which were flowering at the same period of checks (120-140 days after sowing) or about one month earlier than check varieties.