

Abstract

In sunflower production, high seed yield and oil content are depend on genetic, production inputs and cultural practice management. The objectives of this research were to 1) develop sunflower hybrid varieties with high yield and oil content and 2) evaluate the appropriate production inputs for maximizing sunflower growth and yield. In the first experiment, the sunflower hybrid variety development, three sunflower lines (2A, 5A and 10A) from the breeding project were evaluated for N(msms) genotype in order to produce B-line by two methods (1. crossing with inbred testers and 2. using molecular marker). In the first method, if the progenies are male sterility, the genotype of parental lines are N(msms). In the second method, if the lines tested using HRG01 and HRG02 markers do not display DNA bands at banding 454 and 740 bp, the genotypes of these lines are N(msms). The results showed that 32 out of 120 plants of the selected lines (2A, 5A, 10A) were indicated for N(msms) genotype by both methods. Then, these 32 plants were selected to produce three crosses (2Ax5A, 2Ax10A and 5Ax10A). These hybrids were grown and compared with a commercial hybrid variety (Pacific77). The results showed that all of three hybrids had similar seed yield and oil content with Pacific 77. However, their agronomic characters were not as uniform as the commercial hybrid variety.

In the second experiment, yield improvement by cultural practices, the several production inputs were studied. Firstly, the effects of water application on sunflower growth and yield were tested in a sandy clay loam soil. It was found that water application at 30 and 50% of available water holding capacity (AWHC) and the application frequency of every 6-10 days resulted in the highest sunflower growth and yield. Secondly, the effects of fertilizer application on sunflower growth and yield were tested in the same soil. The results showed that the N-P-K application based on soil test + organic fertilizer and micronutrients and the N-P-K application based on soil test + micronutrients gave the highest sunflower growth and yield. Moreover, it was found that the application of boron (B) in the form of boric acid at the rate of 1500 g/rai with organic fertilizer resulted to more pollen viability, high seed setting and grain yield. Thirdly, the effects of planting density on sunflower growth and yield were tested. The results

indicated that the optimum planting densities were 70x30 and 65x30 cm. Fourthly, weeding methods in sunflower were tested. It was found that the use of pre-emergence herbicide with mechanical weeding at 35 days after planting resulted in the highest sunflower grain yield. From these results, optimum levels of each factor were combined, divided into three levels (low, medium and high), and were tested in sunflower. The low level was a farmer practice, the medium level was the combination of N+P+K application based on soil test + micro nutrients, 6 times of water application and two times of weeding, and the high level was the combination of N+P+K application based on soil test +organic fertilizer+ micro nutrients, 10 times of water application and two times of weeding. The results showed that medium and high input levels gave higher sunflower grain yield than the low input level.