



Selection for Cytoplasmic Genetic Male Sterile lines with stable sterility in late season planting

Arthur B Hill

SAFFTECH 1321 Fig Place Davis, California 95618-1441 USA

Abstract

The effect of planting date on the expression of the cytoplasmic male sterile character is described. Weather conditions caused planting delays and the implications are discussed. It was previously determined that the best time to plant safflower in the lower Sacramento valley is between March 15 and April 15. These dates also seem to be best for expression of cytoplasmic male sterility (CMS).

Introduction

In some years, weather conditions prevent planting of the CMS safflower lines at the preferred time of March 15 to April 15 in Northern California, USA. Previous CMS production fields planted at the preferred dates showed no pollen production on the CMS female. In 2006 and 2007 the CMS lines were planted May 20 and May 10 respectively. This late planting resulted in the shedding of pollen by the CMS lines. These fields were abandoned. A plan was formed to correct problems with delayed planting of CMS lines.

Methods and Procedures

The area in Northern California where all the fields were planted is 38 degrees N. There is no frost during this planting season. The average rainfall is 19 inches a year, mostly occurring in the winter, rarely into March. The fields were irrigated as needed to provide for germination and full plant development. Weeds were controlled. All the fields were planted beds at approximately 10 pounds of seed per acre.

In 2006 cages were planted in early April. As stated earlier, the field isolation was not planted until May 20 and was largely abandoned due to pollen shedding on the female. However, there were approximately one hundred CMS plants in the abandoned field that had no anthers. These plants were crossed with single maintainer plants from the 2006 cages. The males used were also selfed.

The crosses and the selfed maintainer plant that was used in each cross were divided. One half was planted April 1, 2007, and the second half was planted May 15, 2007. Both dates were planted in cages. The April 1 planting produced all anther-free females. The plants from May 15 produced mostly pollen shedding females. However, 20 of the females from May 15 had no anthers. Any of the plants with anthers were discarded.

On March 25, 2008, cages were planted with crosses and selfed seed from the 2007 cages. There were no problems with pollen shedding in any females. Because of the risk of failure from late planting and the need to increase the newly developed CMS lines, further investigation into the effects of late planting was not undertaken this year.

Discussion

Because planting date has shown to be important in the production of safflower hybrids, it is essential to resolve late planting problems. In California only one safflower crop can be grown each year. Hybrid safflower relies on continuing to maintain, increase, and improve the lines. This is a costly and labor intensive project.



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Conclusion

Safflower hybrids have the promise of increased seed yield and oil content when compared to cultivars. If a field must be abandoned due to poor line performance, it delays potential sales. Without being able to get hybrid safflower seed onto the world market, growers can't take advantage of its benefits.