

History of crimson clover in the USA

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Abstract

Crimson clover (*Trifolium incarnatum* L.) is widely planted in the US southern region as a winter pasture legume and is an important seed crop in Oregon. The history of use and improvement of crimson clover in the US stretches back to the mid 1800's with several changes in management and breeding objectives. Crimson clover was first used in the US as a non-reseeding pasture legume and as a green manure crop. The development of reseeding strains and more recently, improved cultivars with high hard seed levels was critical to modern crimson clover breeding programs and lead to increased use of this annual clover in US agriculture.

Introduction

Crimson clover is the most important annual clover to US agriculture, with primary use as a winter annual forage legume overseeded on warm-season perennial grass pastures in the southeast US. Crimson clover is an important component of forage production systems from Virginia to east Texas and the beautiful crimson flowers enhance the landscapes of both pastures and roadsides in this region. Crimson clover USA seed production (all in Oregon) averaged 1769 Mt/year for 2006 through 2008 (Young, 2010) with a conservative estimated seed sales value of \$4.0 million per year. Crimson clover is native to southern Europe and has been grown in the USA for more than 150 years but with increasing use in the last 60 years (Piper, 1935). As introduced from Europe, this forage legume did not have high hard seed levels and was not reliable in producing volunteer (reseeding) stands in the humid subtropical climate of the eastern and southeast USA (Hollowell, 1947).

Early use

Duggar (1898) noted the potential of crimson clover as a green manure crop for use in cotton cropping systems in Alabama. Interest in the use of crimson clover as a grazing crop in the southeast increased in the 1940's as reseeding strains became available (Donnelly and Cope, 1961). Crimson clover was grown as a seed crop and as a combination grazing and seed crop in the southeast US for 40 years beginning in the 1930's. Crimson clover seed yields in Alabama ranged from 110 to 900 kg ha⁻¹, depending on soil type, plant nutrition and insecticide treatments (Donnelly and Cope, 1961). Insecticides were necessary to control clover head weevil (*Hypera meles* F.).

Crimson clover seed production in the southeast US declined rapidly in the 1960's and early 1970's (personal communication, Dr. Jim Bostick, Alabama Crop Improvement Association). Some possible reasons for this decline are: loss of seed harvest and processing infrastructure; shift from clover and grass pastures to nitrogen fertilized grass pastures; inconsistent seed yields because of unpredictable rainfall during seed harvest; and clover head weevil damage to the crimson clover seed crop.

Crimson clover in Texas

The exact beginning of crimson clover use in Texas is difficult to discern but for Rusk County, Texas the first crimson clover planting is well documented. Reseeding crimson clover was introduced to east Texas in 1949 from Alabama (Anon., 1951) and interest in this new clover increased rapidly as results from the first plantings were noted. The attributes that made crimson clover a success at this time in Texas were: three months of late winter and spring grazing; reseeding stands; and cash income from seed crops. Texas Governor Allan Shivers proclaimed the week of April 30, 1951 as Crimson Clover Week. Dr. Bruce McMillan, a prominent Rusk County agricultural leader, was instrumental in the introduction of this new clover from Alabama.

Crimson clover improvement

“Dixie” crimson clover was developed in Georgia in the early 1950's in response to the need for a cultivar with improved reseeding traits that could also be produced as certified seed. Dixie is a composite of three crimson clover farm strains that exhibited excellent field reseeding, high forage yields and high hard seed test results in laboratory evaluations (Hollowell, 1953). As recent as 1959, common crimson clover had less than 5% hard seed at harvest (Bennett, 1959), but improvement in the hard seed level through recurrent selection could be demonstrated. “Chief” crimson clover was developed in Mississippi (Hollowell, 1960) through nine cycles of recurrent selection for hard seed with the final generation stabilized at 65% hard seed (as measured at harvest with hand-cleaned seed).

The hard seed trait in Dixie crimson clover was shown to be very stable over years and environments in a nine year study conducted in Alabama, Mississippi and Georgia in the 1950's (Knight et al., 1963). The hard seed level of Dixie was consistently 60 to 80% at harvest with little effect from seed production location or year. In a three year experiment in Texas beginning in 1994, Dixie crimson clover averaged 33% hard seed at harvest (Evers and Smith, 2006) but did produce acceptable reseeding stands (>100 seedlings m^{-2}) in each year if grazing was terminated by mid-April. This indicates a reduction in hard seed level for this cultivar (reduced from levels reported in 1963) and may explain the variability in crimson clover reseeding in years with sporadic fall rains.

Both “Flame” and “AU Robin” are crimson clover cultivars selected for early maturity out of Dixie (Baltensperger, et al., 1989; van Santen, et al., 1992). Parental lines of AU Robin were

selected based on bloom date, dry matter yield and nitrogen yield. Flame was selected from a population of Dixie that had reseeded for seven years in warm-season perennial grass sod under winter grazing and summer hay management. Additional crimson clover cultivars are described in Table 1.

Table 1. US cultivars of crimson clover.

Cultivar	Year of Release	Organization	Eligible for Certification in Oregon
Dixie	1953	Georgia AES	X
Chief	1960	Mississippi AES; ARS	X
Auburn	1961	Alabama AES	
Frontier	1963	Mississippi AES; ARS	X
Tibbee	1972	Mississippi AES; ARS	X
Flame	1989	Florida AES	X
AU Robin	1992	Alabama AES	X
AU Sunrise	2000	Alabama AES	X

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