

Balansa Clover: A Reseeding Legume Cover Crop for No-Till Systems

S.M. Dabney, D.W. Reeves, K.C. McGregor USDA-ARS, J.L. Douglas USDA-NRCS, N.W. Buehring, J.R. Johnson MAFES

Rational: Adapted reseeding legume cover crops can reduce erosion, suppress weeds and contribute N at low cost in the Southeastern U.S. Early maturity is needed to avoid delaying main crop planting and to avoid development of insect pests. Hard seed may allow volunteer cover crop regeneration for several years from a single seed crop, increasing cropping system flexibility and robustness.



Balansa clover bloomed (right) bloomed earlier than crimson clover in Tiptonville, TN (zone 6b) after a mild winter.

Balansa clover was named *Trifolium michelianum Savi* in 1798 (Flora Pisana 2: 159). It is sometimes called *Trifolium balansae* Boiss. or *Trifolium michelianum* subsp. *balansae* (Boiss.) Ponert. A landrace of balansa clover collected in Turkey in 1937 (37.77N 29.10E) was released in 1952 by the Alabama office of NRCS with the name 'Mike.' Small amounts of seed of this accession are available from the PI station in Athens, GA.

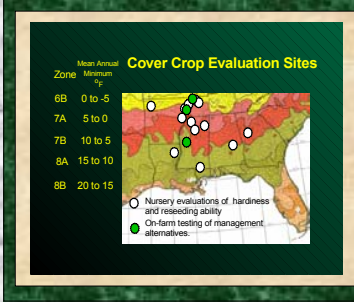


Balansa clover seed is produced commercially in Australia. Imported Paradana seed sells for about \$2.5/kg in the U.S., coated or uncoated.

Seed of several cultivars is commercially available from Australia. 'Paradana' was released in 1985. It was derived from Turkish introductions crossed and tested at Kangaroo Island, NSW, Australia. Ungrazed, it grows up to 1 m high and produces thick hollow stems that are palatable and of good feed value. It becomes more prostrate when grazed. Seed yields over 600 kg/ha have been obtained. Established stands are tolerant of waterlogging, moderate salinity, and soil pH from 4.5 to 8.0. Other cultivars include 'Bolta' (1998) that is 1 to 2 weeks later than Paradana and 'Frontier' (2000) that is 2 to 3 weeks earlier.



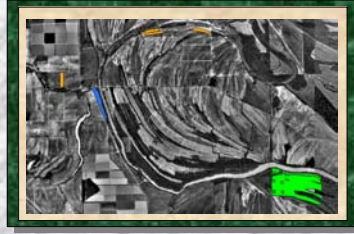
In Denwood, AR, 'Paradana' balansa clover produced more than twice the biomass of volunteer winter weeds (background) and as much as 'Rymin' rye (farther background) when it started to bloom in early April.



Approach: Cover crop adaptation was tested by screening collections with cooperators at a climatically diverse sites. 'Tibbee' crimson clover (*Trifolium incarnatum*) was used as a phenological check. Growth was terminated 2 to 3 weeks after Tibbee bloomed at each location to identify adapted cover crops that were earlier to reseed than Tibbee. On farm field trials are used to identify practical management systems.

Results: spotted burclover (*Medicago arabica*) and balansa clover (*Trifolium michelianum Savi*) were the best reseeding legume cover crops that were hardy throughout zone 7A. Of these, only balansa clover is currently commercially available.

Balansa clover is open pollinated. Flowers vary from white to pink and are attractive to bees. Leaflets are variable, with about 40% having markings. Leaf margins are commonly serrated.



On-farm split-field tests are underway to identify the most practical ways to incorporate reseeding balansa clover cover crops into cropping systems in the Mississippi Delta. This research has shown that the largest cost is associated with delaying crop planting until after seed formation in one year out of four.



Balansa clover seeded following corn harvest in the Mississippi Delta (Anderson farm, zone 8a) was at full bloom in early April 1999. Growth was terminated May 13, 1999 and soybean was planted.

Because of its small seed size (from 1000 to 1400 per gram), only 5 kg/ha gives a dense stand. We plant 5 kg/ha of plain or 8 kg/ha coated seed. Ideal planting depth is 7 to 10 mm. Good stands have been obtained by broadcasting seed into low residue crops like cotton. Heavy residues impair stand establishment.

Seed is imported by Kamprath Seed Co. (800-466-9959), Manteca, CA, and is sold with or without Rhizo-Kote XL coating applied by CelPriI Inc. of Manteca, CA.



First-year reseeded balansa clover at the Anderson farm contained 70 kg N/ha when growth was terminated prior to corn planting in late Feb 2000 following a favorable fall and winter.



First-year reseeded stands were ~2000 plants/m² on the Walker farm. This cover contributed 70 kg N/ha to a following cotton crop.



Following corn, a dry fall, and a cold winter, second-year reseeded balansa clover growth was small on the Anderson farm in early February 2001. Note henbit (*Lamium amplexicaule* L.) was not shaded out yet.

Arthropod impacts: Legume cover crops are early season hosts of major insect pests including tarnished plant bug (*Lygus lineolaris* (Palisot de Beauvois)) and the Heliothine complex of corn earworm (*Helicoverpa zea* (Boddie)) and tobacco budworm (*Heliothis virescens* (F.)). In the Mississippi Delta, tarnished plant bug overwinters as adults. The earliest F1 nymphs appear on host plants during mid-March. Bollworm and budworm overwinter as pupae, and F1 larvae begin appearing in mid-April. For the earliest heliothine pest (bollworm), termination of cover crops prior to 10 May prevents pupation of the F1 generation. Paradana balansa clover makes hard seed prior to this date.

Spring tillage reduced reseeding of Paradana balansa clover in a cotton production tillage system following seed production in May 1997 at Holly Springs, MS

Tillage System	First Reseeded Crop (% ground cover) December 1997	Second Reseeded Crop (number/m ²) December 1998	Third Reseeded Crop (number/m ²) December 1999
Till	6%	3	6
No-Till	38%	94	84

Spring tillage reduced stand density, for two reasons: (1) burial of small seed and (2) more rapid softening of hard seed due to wider soil temperature fluctuations.

Location	Year	First Bloom (DBT)	Termination (DAFB)	Reseeding (Number/m ²)	Biomass (Mg/ha)
Coffeenville, MS	93	23	31	15	2
Coffeenville, MS	96	15	28	195	3.7
Como, MS	93	9	36	6	3.3
Como, MS	94	22	50	110	2.5
Como, MS	95	14	32	245	2.8
Shorter, AL	93	30	77	nd	3.5
Shorter, AL	94	10	41	768	6.1
Shorter, AL	95	10	40	190	1.4
Stonerville, MS	95	6	23	844	7.6
Verona, MS	93	12	27	53	2.5
Verona, MS	93	6	35	19	6.9
Verona, MS	94	7	42	14	6.8
Mean		13.7			4.3

DBT = Flowering days before Tibbee; DAFB = Days after first bloom

Stand density of planted and reseeded balansa clover in the Mississippi Delta during December 2000

Farm or Field	Planted (broadcast) Seed (number/m ²)	First Reseeded Crop (number/m ²)	Second Reseeded Crop (number/m ²)
Anderson			196
Walker		1990	
Watson	90		
JB West	115		
Charlies	32		
Stowers	18		
Sripes	96		

- Summary:**
- Allowing balansa clover to grow for 40 days past first bloom every 3 to 4 years will allow stands to persist indefinitely in no-till systems.
 - Seed cost is minor compared to opportunity cost and risk associated with delaying main crop planting past the optimum date.
 - Reseeded (regenerated, volunteer) stands are denser, bloom 5 to 7 days earlier, and are more productive than planted stands because of higher seedling density and growth beginning whenever conditions are favorable.
 - Nitrogen accumulation in above ground biomass is about 25 kg/ton or about 70 kg/ha at full bloom.
 - Regeneration is best when spring tillage is minimized and soil retains moderate residue cover.
 - Heliothine pest will not be increased if growth is terminated 40 days after first bloom, but the cover crop will contribute habitat for F1 plantbug nymphs.

