

NEW BALING PRESS FOR GIN WASTE (GIN TRASH) FOR ADDITIONAL REVENUE

Raymond C. Adams
C&M Baling Systems, Inc.
Winston-Salem, NC
Wesley A. Morgan
Rolling Hills Gin, LLC
New London, NC

Abstract

Cotton gin waste collection and disposal has evolved since the 1960's when gin-type incinerators were mostly abandoned due to the enactment of the Clean Air Acts of 1963 and 1970. Gin waste includes burs, sticks and stems, leaf, fine trash, short fibers and motes or immature seed. Beginning in the 1950's and 1960's, with the acceleration of mechanical harvesting and the development of the lint cleaner, much of the short waste fiber and immature seed were removed from gin waste (with the remaining organic materials called "gin trash"). With the capability to remove additional short fiber and motes with saw-type lint cleaners, the separation and baling of this waste fiber became economically feasible. Because a growing supply of baled waste fiber from cotton gins was available that could be stored and shipped to processing plants, new uses were engineered, and markets developed. Collecting, baling, and shipping of baled waste fiber added revenue to cotton gin operations and helped resolve a serious problem of that time when blowing cotton lint was a major environmental issue for gins.

Disposing of or selling the remaining gin waste has continued to be costly for most cotton gin operations because organic waste is lightweight, requires considerable energy to convey long distance and is usually handled multiple times prior to ultimate disposal. There are limited local or long distant markets for gin waste due to the cost of storage, handling, and shipping.

Introduction

The remaining organic gin trash (or gin biomass) and some remaining motes and fiber, can become the next profitable byproduct of the ginning process. Because the collection, conveying, storage, handling, and shipping of gin trash have been obstacles to developing feasible and profitable markets for most gins, the disposal of gin trash remains a cost item, and not net revenue, for many gin operations. However, just as waste cotton and motes can be cleaned and baled at the ginning bales-per-hour rate, the residual gin waste can also be baled, at the ginning bales-per-hour rate. When baled, gin trash can be efficiently shipped directly to existing consumers of gin waste, processed onsite, stored for future shipment, or shipped long distance to new customers within the same type of market. In addition, new uses or markets that can potentially return greater revenue to gins are likely to develop. For example, there are some rapidly developing technologies to convert agricultural biomass, such as gin trash, to energy (syngas & biochar).

Baling Gin Trash**What Does Not Work**

Over the past 15 years, C&M Baling Systems, Inc. staff and personnel have conducted numerous trial baling tests utilizing various sizes and styles of traditional single ram door style & open end style horizontal baling presses as well as vertical down-packing presses attempting to successfully bale waste from textile mills, mote processing plants, cotton gins, or related agricultural biomass producers. Generally, test bales of those materials could not be formed and shape/density retained with baling wire or strapping. On the few occasions when a bale could be formed and did retain density, the procedure was sufficiently complex such that repeatability could not be expected...and, most certainly would not be suitable for use baling gin waste at a real-time ginning rate.

Module builders have also been used to densify gin waste, but that practice has not become widespread. Balers used in the recycling industry have been tried, but baling gin trash is not similar to baling cardboard or paper, and even the largest and most powerful two ram balers have proved unsuccessful.

What Works with Limited Success

Several gins have acquired new or used cotton mote presses to bale gin trash. Most gins that have tried doing so have determined that process is not feasible because the bales are of such poor quality. The handling/moving of bales and

retention of bale density is a serious problem. Deploying considerable effort, some gins, including Rolling Hills Gin, LLC, have experienced limited success baling gin trash by making modifications to their mote press. As a result, those gin operations have had the opportunity to develop local markets for all or some portion of their gin's baled gin trash.

Objectives of Development (C&M Gin Trash Baling Press)

- Determine a method to produce marketable bales of gin trash (gin biomass).
- Maintain a reasonably consistent bale size and weight for marketing and shipping.
- Receive and bale all gin trash removed during ginning at the normal BPH ginning rate.
- Keep labor cost low and share dedicated labor with mote press or other gin operations.
- Minimize dust and allow for a clean gin facility environment.
- Produce dense bales of gin trash that can be shipped long-distance at low cost.

How to “Make A Market” for Gin Biomass or Gin Trash

It is a given that to make a market for a product first requires both a usable commodity and an available consumer. The product should be available to the consumer at a cost lower or comparable to other competing products unless the product has quality elements exceeding competing products or is more readily available.

Gin trash has been used successfully for many years as livestock feed or roughage and for composting. There are numerous studies regarding the nutritional value of gin trash as a feed supplement for cattle and there seems to be a correlation to the value of gin trash as a supplemental feed and that of lower quality hay as well as the availability of hay. However, much of the research has been based on gin trash collected from outdoor gin trash piles that has been wet and the nutritional value lowered as a result. In addition, low bulk density handling and shipping of gin trash has added cost to moving gin trash to all markets...and lowered the value.

To make a viable dependable market for most products, there must be an adequate, or abundant, dependable supply of product (gin trash). To justify an investment in machinery and equipment to produce energy from biomass, such as gin trash, there must be an adequate or abundant dependent supply, which can be evenly processed, for use year-round and not just 90-120 days each year.

High density baling of gin trash to reduce handling and shipping cost, combined with a uniform bale weight and size are, and abundant supply, we believe, are the primary essential elements to making profitable markets for this gin byproduct...markets that were delayed for decades due to the cost of handling, storage, and shipping.

Basic Description of the Rolling Hills Gin C&M Gin Trash Baling Press

After considering the loose density of discharged gin trash (~10 lbs per cubic foot) and the cubic feet displacement needed to continuously load the baling chamber after each cycle of the compression ram, it was decided to use a 10' to 12' high in-feeding chute above the press baling chamber. Gin trash was discharged into the in-feeding chute from a drag belt that loads under cyclones from the existing trash conveyor. Drawing on past experiences at Rolling Hills Gin, handling and loading gin trash bales made prior years using a modified mote press (bales 30" wide x 30" high), it was decided to select a new bale size of 24" wide x 24" high and 48" to 96" long. Utilizing a modified bale clamp, clamping and loading three gin trash bales in a single trip into van trailers or sea containers and onto flatbed trailers could be easily accomplished, whereas loading 30" wide bales prior years was difficult due to extra space needed to release the clamped bales. The “targeted” gin trash or biomass bale is 24" wide x 24" high x 55"-60" long and weighs 10 pounds per inch of length compressed to 30 pounds per cubic foot density.

For normal operation of the C&M Gin Trash and Biomass Baling Press <patent pending>, a horizontal compression cylinder cycles into the baling chamber each time a photo sensor (located on the vertical in feed chute) becomes blocked by incoming gin trash. The incoming gin trash is compressed into an open-ended baling chamber to a density of 28 to 32 lbs per cubic foot prior to strapping and bale extrusion. The density of compressed gin trash within the special extrusion chamber is monitored and controlled utilizing a combination of hydraulics, electrics, and mechanical actions. Bale lengths, which can be predetermined and altered, are measured as completed bales are extruded from

the baling chamber. Three 5/8" wide plastic straps are semi-automatically applied to each bale to secure the bale density. Bales are easily removed from the bale platform connected to the end of the extrusion chamber.

Recommendations Based on Experiences at Rolling Hills Gin

- Locate customers off season and manage your own logistics.
- Use a gin trash press.
- Use plastic straps to secure bale density.
- Have a trash diverter for problems or wet trash.
- If possible, have some storage area for completed bales.
- Have a floor sweep reclaim system to remove loose gin trash from the work area.
- Install a dust control system to the press.

Conclusion

Ginners can now consider replacing the traditional outside discharge and storage of gin trash and utilize instead a high-density horizontal baling press that can be efficiently operated to produce dense marketable bales that can be shipped to customers nearby, across the country, or overseas. As was experienced over 50 years ago with the baling of short fiber waste and motes, gin trash can be baled. Existing markets for gin trash will be expanded, and new markets established. Cotton gin trash, or gin biomass, can become an important and more profitable byproduct for many cotton gins and increase revenue.