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THE USE OF PROTAG® TO CONTROL COUNTERFEIT SEED SALES

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Abstract

ProTag® is a new product-authentication technology which is uniquely suited for the protection of seeds and seed packaging from counterfeiting.

Counterfeit production and sales of seed is a growing concern worldwide, especially in developing countries, and cotton is one of the major economic crops targeted by such fraud. The commercial consequences of this activity include reduced sales, increased warranty costs, and negative impacts on product quality image. The ProTag® system provides a precise and economical means of validating seedlot origins from the warehouse, through the supply chain up until shortly after sowing in the field. The system is simple, convenient and integrates well with standard seed treatment technology.

ProTag® technology is based on the principle of nuclear magnetic resonance: certain molecules absorb energy when irradiated with radio-frequency (RF), and then emit RF radiation at different frequencies in response.

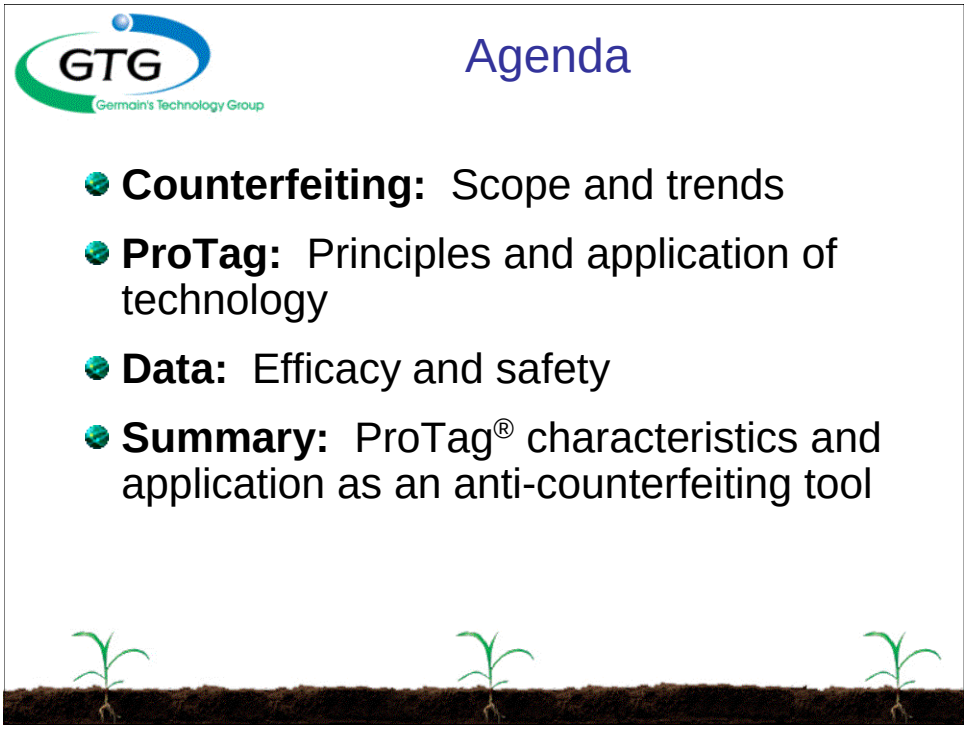
The ProTag® system comprises specific *taggants* in combination with tuned *readers* to detect their presence. The ProTag® taggants are microfine chemical powders. Each has a unique “fingerprint” - absorbing and re-releasing energy at individual radio frequencies - and it is impossible to reverse-engineer or duplicate them. The taggants are co-formulated with polymer binders, and applied in trace amount levels (typically tens of grams per ton of seed) with conventional seed treating, filmcoating and pelleting equipment; alternatively they are disguised in printing inks on packaging. Effectively, in use they are “invisible” to the human eye. The taggants are inert, non-toxic to seeds, animals, and the general environment.

The presence of each taggant is verified with a handheld battery-powered ProTag® reader, which is held close to the tagged object. The reader emits a low-power detection-RF pulse and instantaneously detects the appropriate response-RF signal emitted from the taggant present on the seed (or other tagged object). Modified readers can quantify the amount of taggant present.

ProTag® is the result of an exclusive collaboration between Germain’s Technology Group and MicroTag Temed.

Slide 1: ProTag® product authentication technology

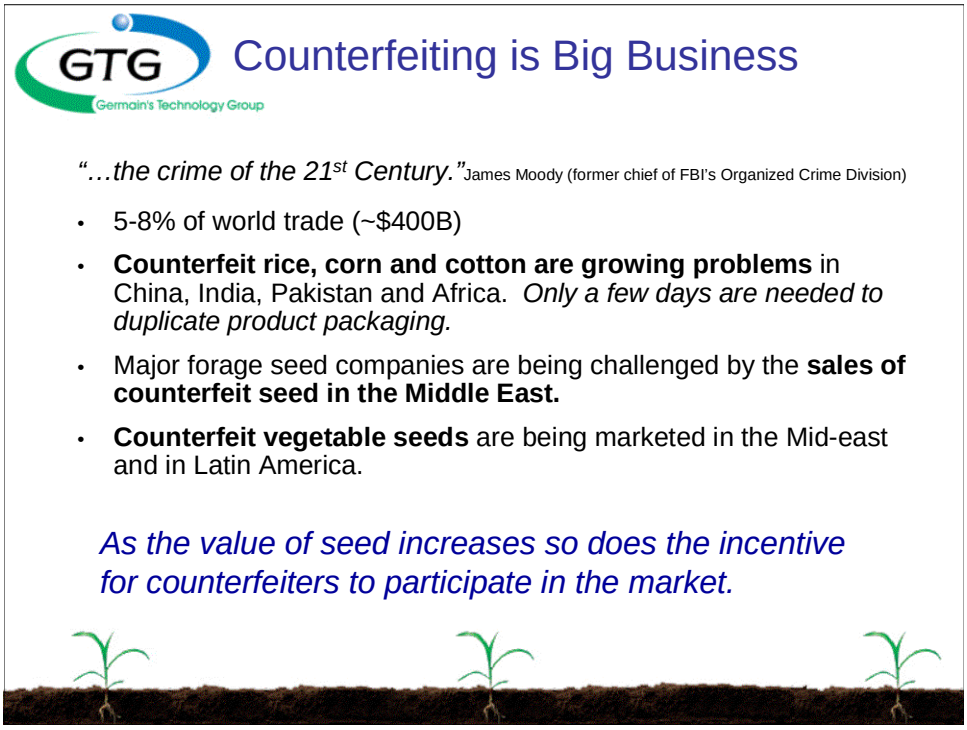
ProTag® product authentication technology was developed and patented by MicroTag Temed, LTD of Israel. It is used commercially as a tool to prevent counterfeiting of cigarette tax stamps, electronic components, consumer goods, and other high value items. Germain's Technology Group has exclusive rights to the use of ProTag® for agricultural uses, including seed treatment, seed applied chemicals, and seed packaging.



Slide 2: Agenda for presentation

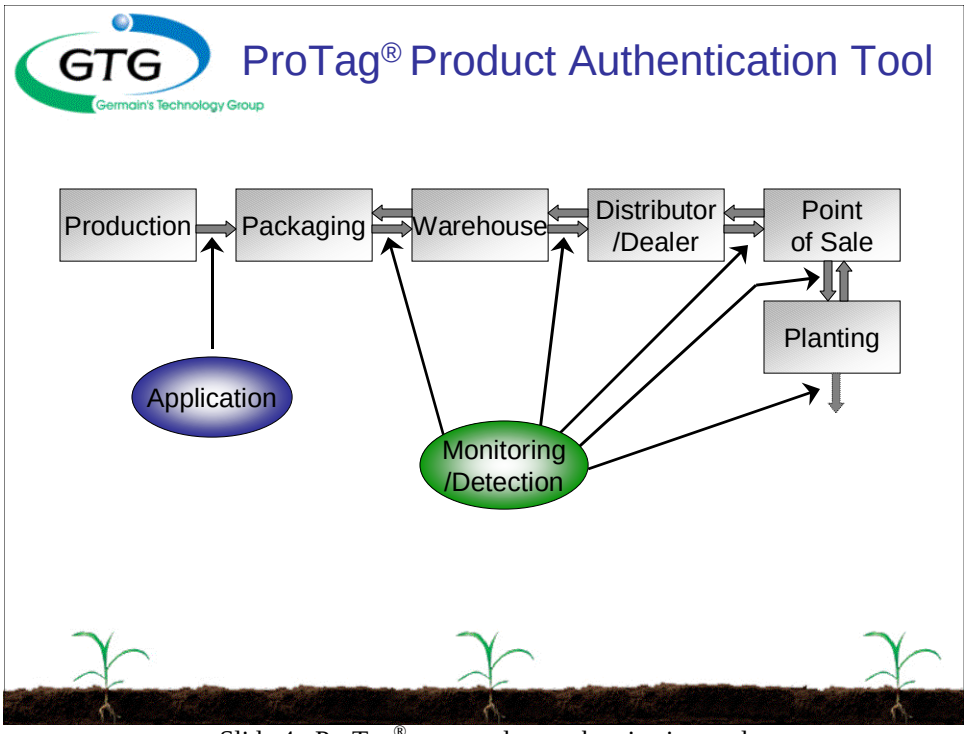
This presentation will address briefly (1) the scope and trends of counterfeiting activities, (2) basic principles and application of the ProTag® technology, (3) specific data on the efficacy and safety of ProTag® on cotton seed, and (4) a brief summary of ProTag® characteristics and application.

Counterfeiting Trends



Slide 3: Scope and trends of counterfeiting

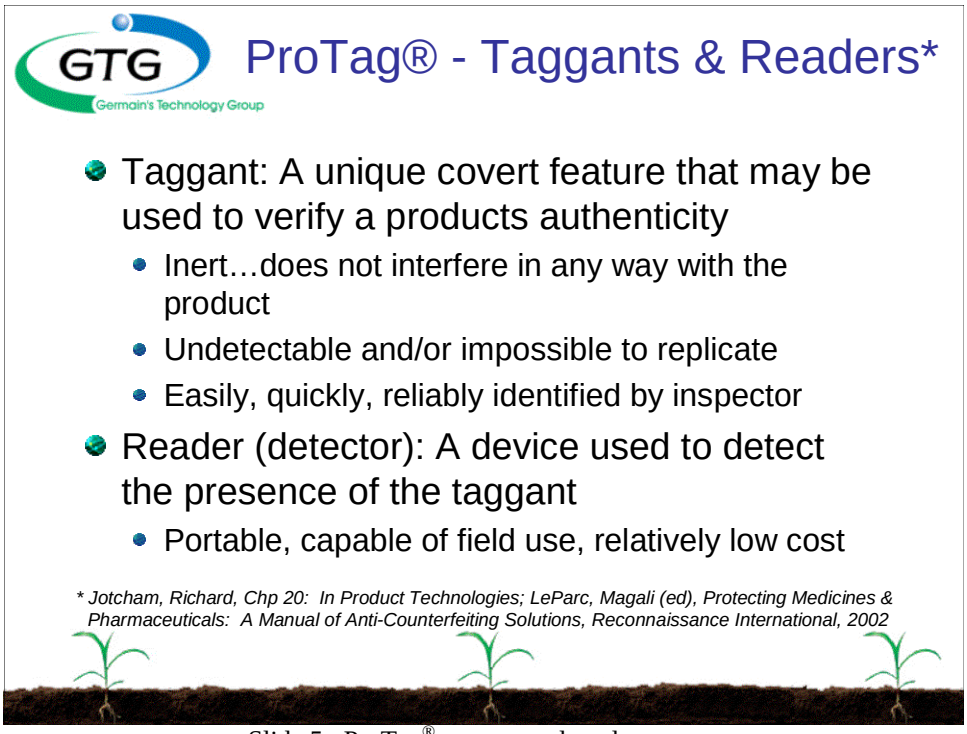
Counterfeiting is a pervasive activity that has been dubbed *"the crime of the 21st century"* by James Moody, the former chief of the FBI's Organized Crime Division. In 2003, counterfeiting activities accounted for $400 billion dollars – 5-8% of world trade. Those counterfeiting activities are limited not only to currency, credit cards, software, music and movies but also extend to pharmaceuticals, cigarettes, consumer goods, automobile and aircraft parts, agrichemicals, and—of particular relevance—seed. Counterfeit seed production and sales have been documented for a variety of crops, including cotton, in Asia, the Mid-east, and in Latin America. Seed marketed in any of these areas is at risk for counterfeiting activities. The greater the value of seed, as new genetic technologies and seed treatments are added, the greater the incentive for counterfeiters to enter the market and compete against legitimate sales.



Slide 4: ProTag® as a product authentication tool

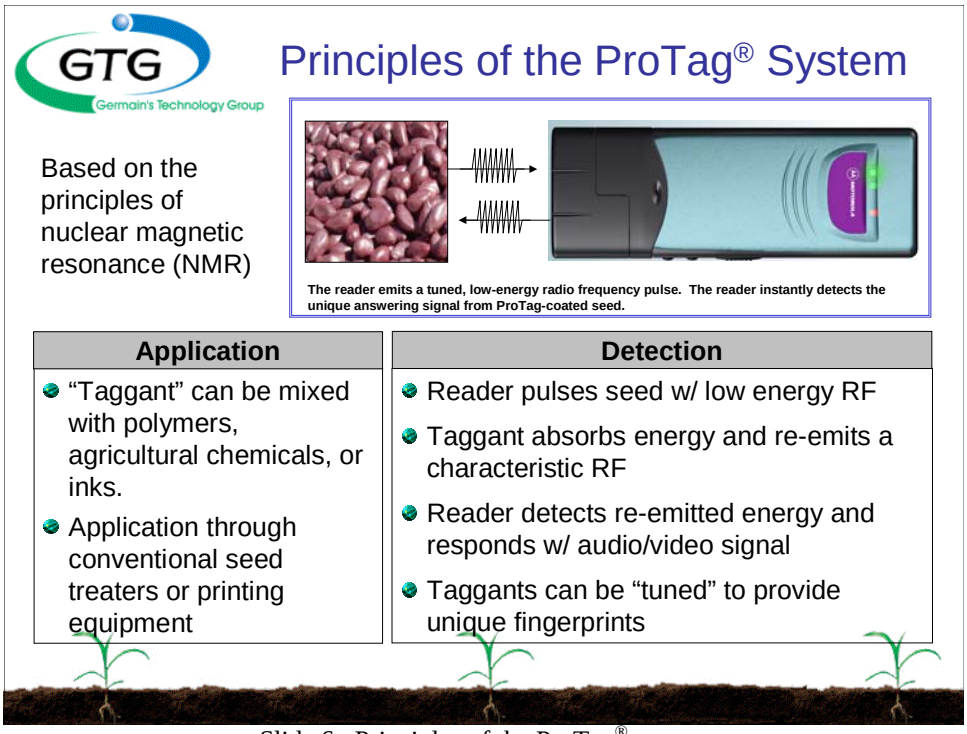
Product authentication is one strategy that is used to combat counterfeiting activities. That strategy has typically consisted of branded bags and logos but counterfeiters have been able to successfully duplicate packaging materials. When more sophisticated product authentication technologies, such as ProTag®, are introduced to the seed or packaging at the time of processing counterfeiters are unable to duplicate their identifying attributes. From that point on, throughout the distribution scheme, it is possible to conclusively validate the presence of the technology and thus the source of the seed. That validation strategy includes not only outgoing seed but, in the case of returns, seed that is returning to inventory. When ProTag® is applied to cottonseed, detection may be possible even after planting and subsequent emergence, enabling protection against fraudulent warranty claims.

Principles and Application



Slide 5: ProTag® taggant and reader system

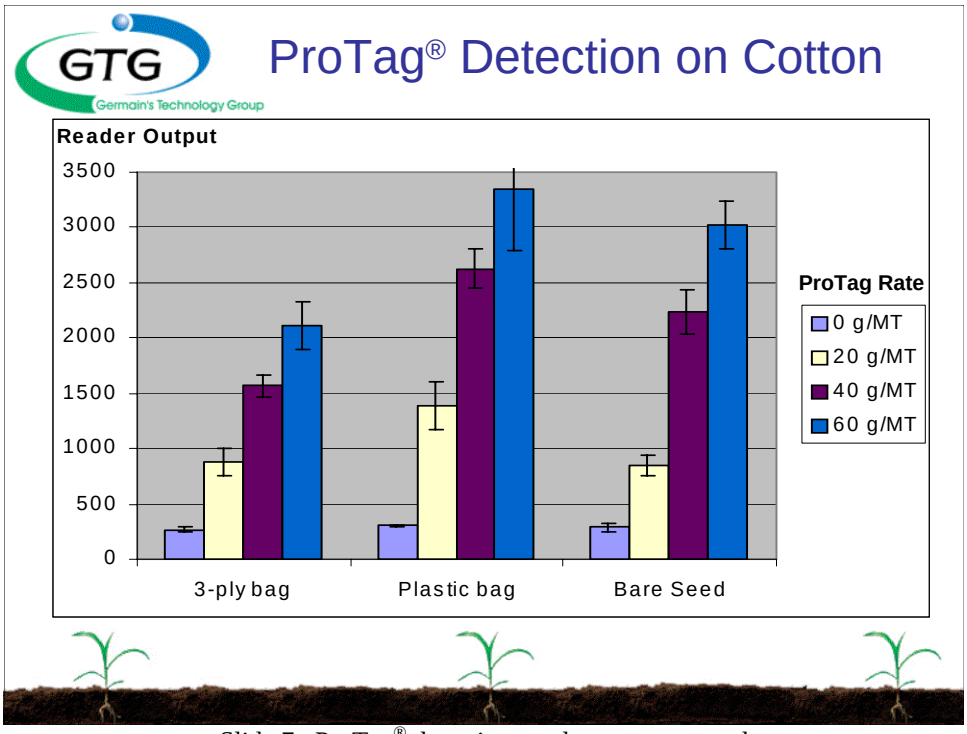
ProTag® is a taggant and reader technology. According to Richard Jotcham in "*Protecting Medicines & Pharmaceuticals: A Manual of Anti-Counterfeiting Solutions"* an ideal taggant reader technology will have the following characteristics. The taggant, a unique covert feature that is used to verify a product's authenticity, will first of all be inert. It will not interfere in any way with the performance of the product. For cotton seed that means it will not impact either seed safety or the efficacy of seed applied chemistries. Secondly, the taggant will be undetectable and/or impossible to replicate, preventing counterfeiters from duplicating the technology. Finally, inspectors must be able to quickly and easily identify the presence of the taggant. This requires that a detector be portable and capable of field use. The ProTag® technology meets all of these criteria.



Slide 6: Principles of the ProTag® system

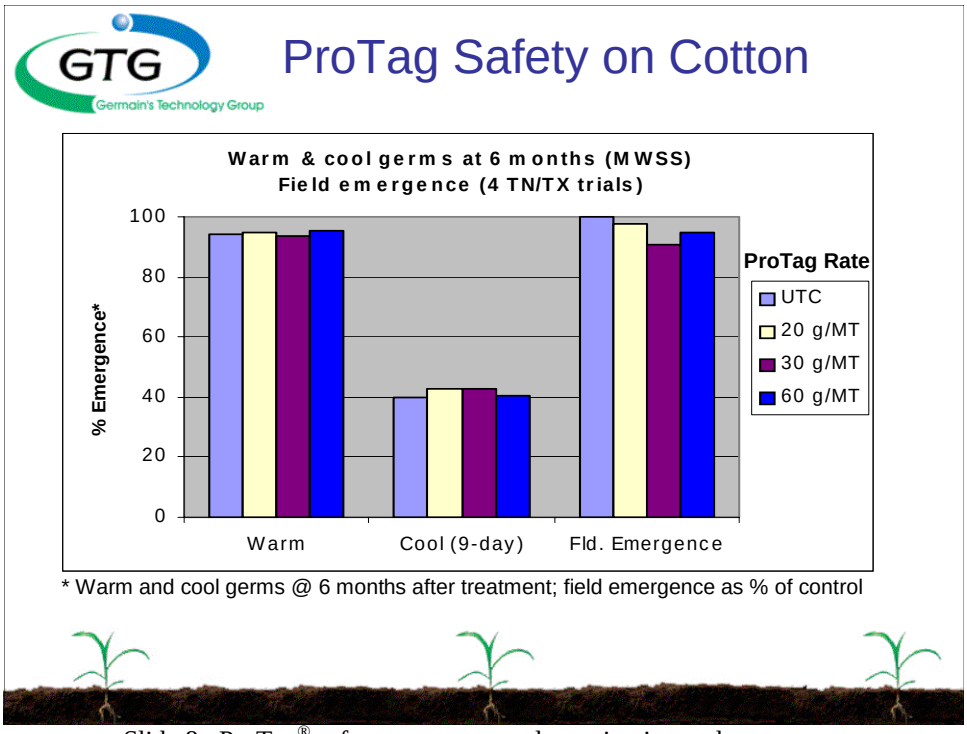
The ProTag® technology is based on the principles of nuclear magnetic resonance (NMR). The taggant itself can be readily blended with polymers or other seed treatments and applied through conventional seed treatment processes and equipment. It can also be mixed with inks for integration into the printing process for bags and labels. Detection or validation of the taggant occurs when the reader transmits a low energy radio frequency (RF) signal. Electrons within the taggant absorb the RF energy and re-emit it at a characteristic frequency which the reader detects. The entire process typically takes 1.5 seconds during which the reader transmits and listens approximately 1000 times and then responds with visual and audio signals. The frequencies at which a particular ProTag® taggant absorbs and re-emits energy are highly specific and enable the synthesis of many unique taggants or fingerprints. These fingerprints are not only unique but are also impossible to reverse engineer or otherwise duplicate.

Performance and Safety



Slide 7: ProTag® detection results on cotton seed

ProTag® is readily detectible on cottonseed at application rates greater than 20 g/MT. Detection is a linear response to the quantity of ProTag® present and does not require direct or even visual contact with the seed, enabling detection through typical seed packaging materials. The strength of the received signal is proportional to the quantity of ProTag® present. This linear response of the detection precludes counterfeiting strategies such as blending or dilutionas a means to circumvent the authentication technology. Signal strength is not directly impacted by any non-metallic packaging materials. RF signal strength is, however, attenuated by distance, accounting for the lower signal strength detected through a 3-ply bag. The ProTag® signal is durable and, in long-term storage studies, has thus far remained detectable over an eight-month period.

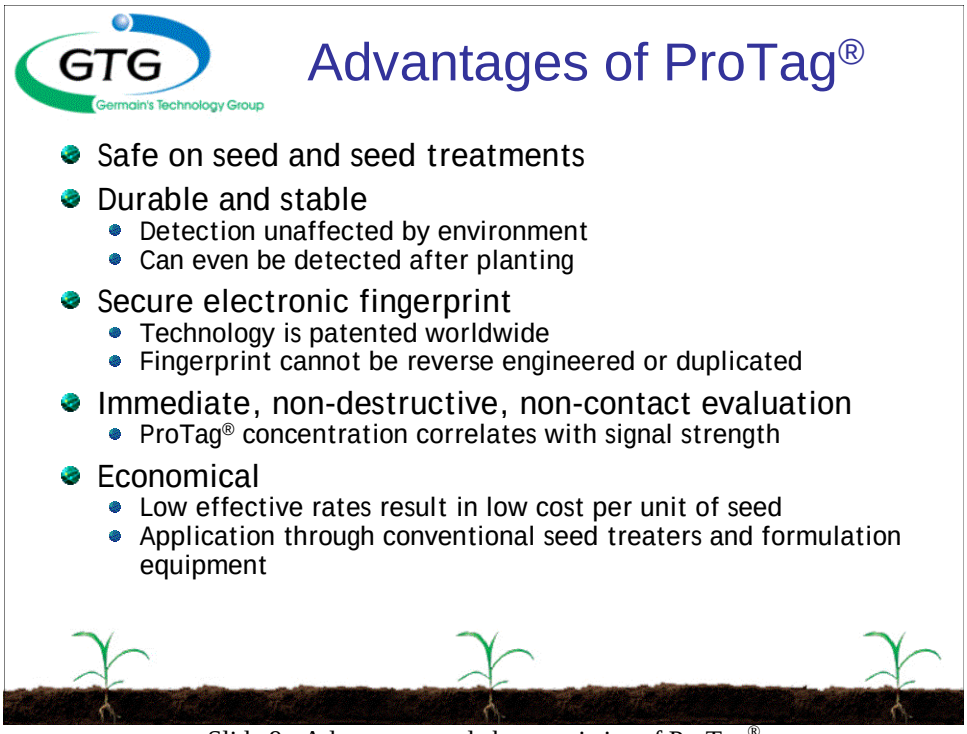


Slide 8: ProTag® safety on cotton seed germination and emergence

ProTag®, at application rates of 60g/MT or less, has no negative effects on germination or seedling emergence. Germination of ProTag® treated seeds tested at MidWest Seed Services after six months of storage is not significantly different than that of the untreated check (UTC). In four field tests conducted in Texas and Tennessee during 2004, there was no significant reduction in emergence as a result of treatment with ProTag®. Although ProTag® application rates were limited to a maximum of 60 ppm (60 g/MT) in studies on cotton, sugar beets have been treated with rates as high as 10,000 ppm with no reduction in germination after extended storage.

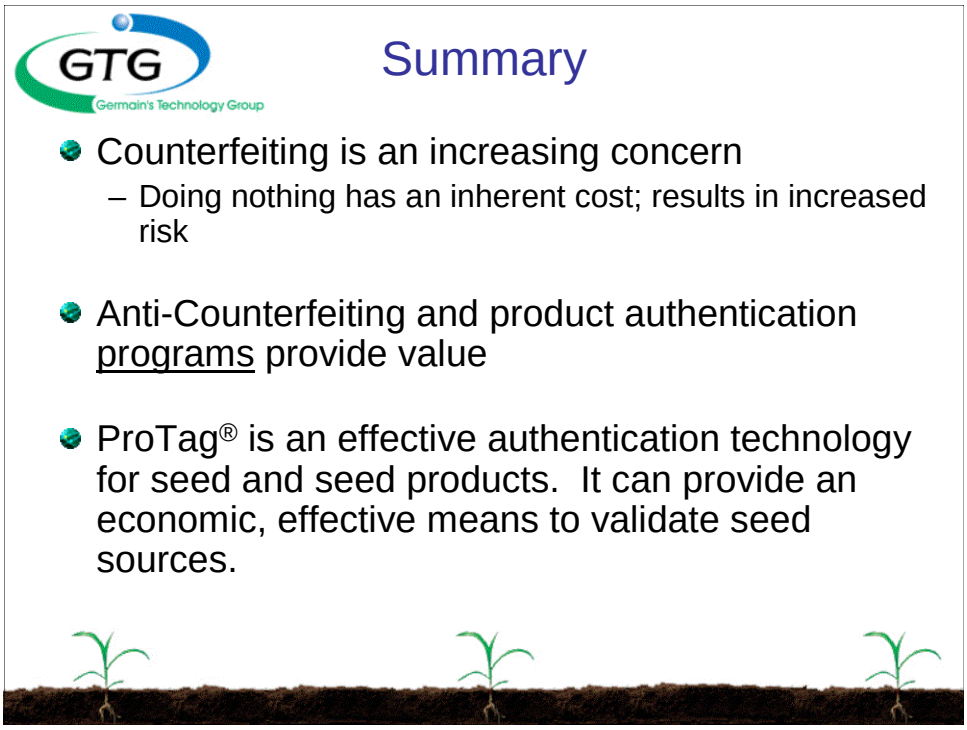
Summary

Counterfeit seed sales are an increasingly prevalent problem impacting seed markets in countries in both hemispheres. Doing nothing about the problem has an inherent cost as it results in increased vulnerability, lost opportunity, and may negatively impact a company's reputation. Product authentication technologies create value and have demonstrated their effectiveness as a means to control counterfeiting.



Slide 9: Advantages and characteristics of ProTag®

The characteristics of ProTag® make it an attractive fit in an anti-counterfeiting program. The taggant is safe on seed and does not adversely affect the performance of seed applied chemistries. It is stable over a wide range of temperatures and is durable enough to allow detection even after planting and emergence. The technology is patented worldwide and the taggants are secure—they cannot be reverse engineered or duplicated. Detection of the taggants and validation of seed is provided via a portable reader which provides immediate results without direct contact or seed destruction. The taggant/reader system produces a quantifiable signal which prevents blending and dilution as a counterfeiting strategy.



Slide 10: Summary of presentation

ProTag® technology is cost effective. Low effective rates result in low costs per unit of seed, enabling a quick return on investment as counterfeit markets are reclaimed. Application uses conventional seed treatment and/or printing technologies and does not require any specialized equipment. ProTag® is a flexible, safe, secure authentication technology which provides a low-cost means to combat seed counterfeiting activities.

Slide 10: Picture of ProTag® reader and cotton seed

References

Jotcham, Richard, Chp 20: In *Product Technologies*; LeParc, Magali (ed), *Protecting Medicines & Pharmaceuticals: A Manual of Anti-Counterfeiting Solutions*, Reconnaissance International, 2002