

Grain Bin Monitoring

US Farmers are increasingly storing their grains at the farm rather than selling at harvest or commercially storing it to increase profits. As the demand for on-farm storage grows, Farmers must employ systems to effectively monitor the quality and condition of their grain. This market currently has cut-throat competition to supply these monitoring systems, typically costing between \$4k to \$50k per grain bin. All monitor & control temperature/moisture in the grain bin typically through the aerator/heater. Some of these systems also monitor CO₂. None monitor Volatile organic compounds (VOCs).

Farmers are at risk for mycotoxin contamination and potential losses. All fungi emit blends of VOCs; the qualitative and quantitative composition of these volatile blends varies with the species of fungus and the environmental situation in which the fungus is grown. Many fungi have biologically produced poisons or toxins; mycotoxins are the most important agroeconomically. Aflatoxin is the most potent, naturally occurring carcinogen known to man. In terms of economic burden, aflatoxins are the most problematic mycotoxins in US agriculture and are found in stored row crops such as corn, cotton seed, millet, peanuts, rice, sesame seeds, sorghum, sunflower seeds, and wheat. Also important is Vomitoxin, also known as deoxynivalenol (DON) which occurs predominantly in grains such as wheat, barley, oats, rye, and corn, and less often in rice, sorghum, and triticale.

Farmers cannot beat the physical laws of storing gains to prevent mold growth and keep the grain in better condition, but they can control them. Visibly moldy grain will be already tainted, and mycotoxin production may have started before Fungal mycelium and spores can be seen. Some species of mites feed on fungi and may mask evidence of fungal growth. While it is difficult to adequately sample grain stores because mycotoxins form “hot spots” it is vitally important to monitor and precisely control them. While existing products monitor temperature and air moisture, none monitors the blends of VOCs which vary with the species of fungus nor pick-up the “hot spots”.

For grain bins equipped with Videns GBM, Farmers simply toss auger tolerant Videns GBM sensor balls into the grain at various levels throughout the bin as it is filled. VidensGBM , measures in real-time, communicates with and stores arrays of compressed chemical spectrographic data, temperature, air moisture and sensor location, (1 foot accuracy) into a database. Assessing the Videns GBM App Farmers accesses the database to monitor mycotoxins and control moisture in the bin atmosphere every hour or set alarms for out of tolerance conditions.

FreshSurety's Videns GBM system is a "seer" of volatile metabolites from mold contamination and designed for early identification of toxigenic fungi to prevent toxicological risks. Videns-GBM serves the grain storage market by providing unmatched sensitivity and selectivity, both measuring and analyzing target signatures within complex volatile organic mixtures in real-time.



	Parameter	Value	Unit	Comment
Communications	Radio #1	6LoWPAN		low-power mesh networking
	Radio #2	169-1092	MHz	Proprietary for use in lossy media
Location	Height	7	cm	CEP in grain bin
	Lat, Lon	1	m	CEP in grain bin
Sensor	Reprogrammable Wide-Band Simultaneous Spectrometer			No consumables
	Sample Introduction	Gas/Vapor Phase		
	Limit of Detection ethylene	<1	ppb	C ₂ H ₄ in N ₂
	ethylene Measurement Range	<1 to 1,200	ppb ppm	Tested in complex mixture of volatile organic compounds (VOCs)
	Reversible Operation	Fully		Non-biofouling design
	Time to Answer	12	seconds	Can make repetitive measurements back-to-back
	Selectivity, (catalyst free)	1.005		(as measured by the useful separation factor points over the range C ₂ -C ₁₂)
	Stable lifetime	> 5	years	
	Temperature Measurement Accuracy	±0.2	°C	
	Equilibrium Moisture Content (EMC)	± 1.6	Percent	Calculated for Corn 10 °C, 60 %RH
Operational Environment				
	Temperature	-20 to 60	Degrees C	
	O ₂	1.5 to 20	percent	
	CO ₂	0.5 to 2	percent	
	Humidity	> 99	percent	Fully saturated @ 0°C

For more information call us at 321-209-8699