



Accuracy of Rapid Testing for Advanced Onsite Wastewater Treatment System Effluent

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Introduction

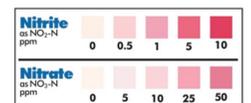
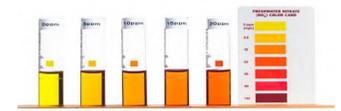


Rapid tests can be used to evaluate the performance of advanced onsite wastewater treatment systems (OWTS).

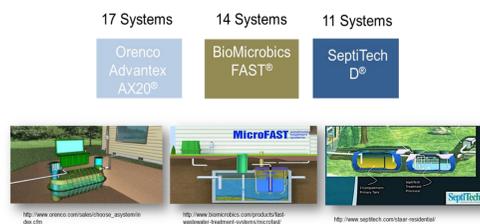
The accuracy of these tests to measure wastewater properties from advanced OWTS has not been investigated.

Some past studies have found test strips to be accurate (Isbell and Mercer, 2006), while others have found them inaccurate for measuring properties in fresh water (Murphy et al., 2014).

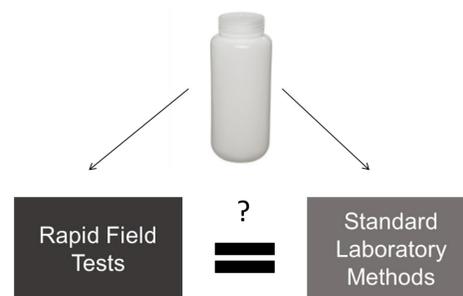
This prompted us to evaluate the accuracy of rapid tests to measure wastewater properties from advanced N-removal OWTS.



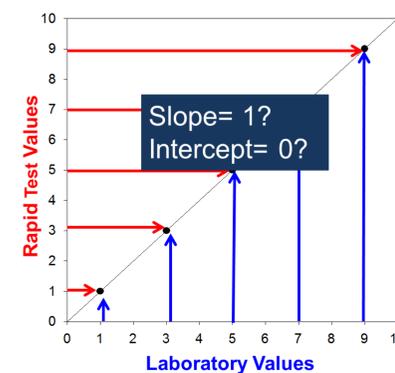
Methods



We collected wastewater samples from the most commonly installed advanced N-removal OWTS in Rhode Island from March to July 2015 from 42 different systems.



We compared values from rapid tests to values from standard (laboratory) methods to evaluate the accuracy of rapid tests.

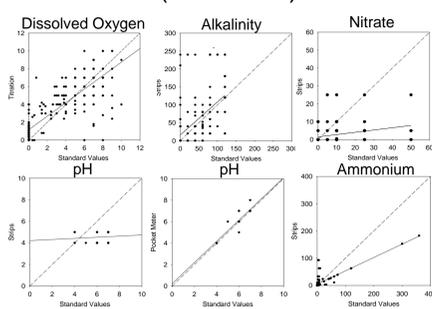


When plotted against values obtained using standard methods, values for an accurate rapid test would yield a linear function with a slope of 1, an intercept of 0, and a R² value of 1.

We plotted laboratory values against rapid test values and used a t-test to detect significant differences in intercept and slope from those of an ideal line.

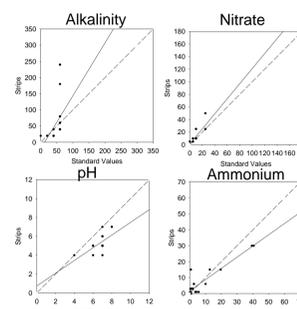
Results

Field Tests Used in the Field (n=39-284)



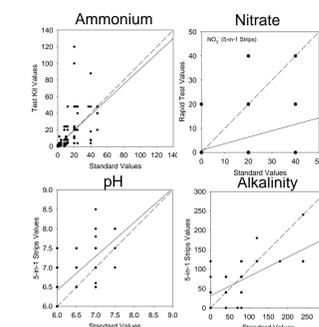
- The intercept for all field tests, with the exception of the pH pocket meter, was significantly different from 0.
- Slope values for all tests, except alkalinity and pH (pocket meter), differed significantly from 1.

Field Tests Used Under Laboratory Conditions (n=24)



- Regression parameters did not deviate significantly from perfect correspondence for any of the rapid tests used.

Alternative Field Tests Used in the Field (n=90-170)



- Regression parameters for alkalinity and pH using the 5-in-1 test strips deviated significantly from perfect correspondence, but not for ammonium and nitrate.

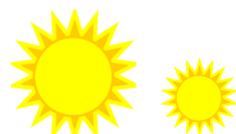
Conclusions



Most rapid tests have problems with accuracy. Their use should be constrained by the application of the data.



Accuracy increased when rapid tests were used indoors, where lighting conditions are stable.



Variations in sunlight in the field can complicate visual comparisons to color charts, leading to inaccuracies.

Acknowledgements



References

Isbell, F. and Mercer, D. 2006. Reliability of Water Quality Test Strips for Field Measurement of Nutrients Essential for Developing Mosquito Larvae. *American Journal of Undergraduate Research*. 5(2), 1-8.

Murphy, L., Cahn, M., and Smith, R. 2014. Accuracy of Test Strips for Assessing Nitrate Concentration in Soil and Water. *Agriculture and Natural Resources Blogs*. Available at: <http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=1314>

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