RIDA®SMART APP – la próxima generación de analizadores rápidos de micotoxinas

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El análisis rápido de micotoxinas no es solo resultados rápidos……

También significa obtener dichos resultados in-situ, básicamente en cualquier lugar en cualquier momento.

Los análisis de micotoxinas basados en cromatografía de flujo lateral son el método de elección para tomar dichas decisiones rápidas……

Ventajas:

- Preparación de muestra y ensayo rápidos y simples
- No se requieren conocimientos especializados
- No hay manejo de estándares de micotoxinas peligrosos
- Resultados cuantitativos con lector

Hasta el momento las mediciones no se hacen in-situ
(típicamente en el laboratorio)

Permíteme que te haga una pregunta:
                        Qué tienen estos 2 en común?

Ambos son lectores de flujo lateral!

Cómo se trabaja con el RIDA®SMART APP?

- Utilice un teléfono inteligente Nexus 6 o NEXUS 6P (V1.2) de Google
- Compre la licencia del RIDA®SMART APP en R-Biopharm
- Baje la aplicación RIDA®SMART APP (código QR en la licencia)
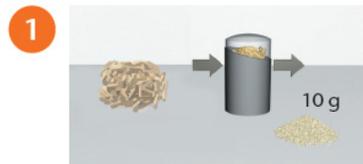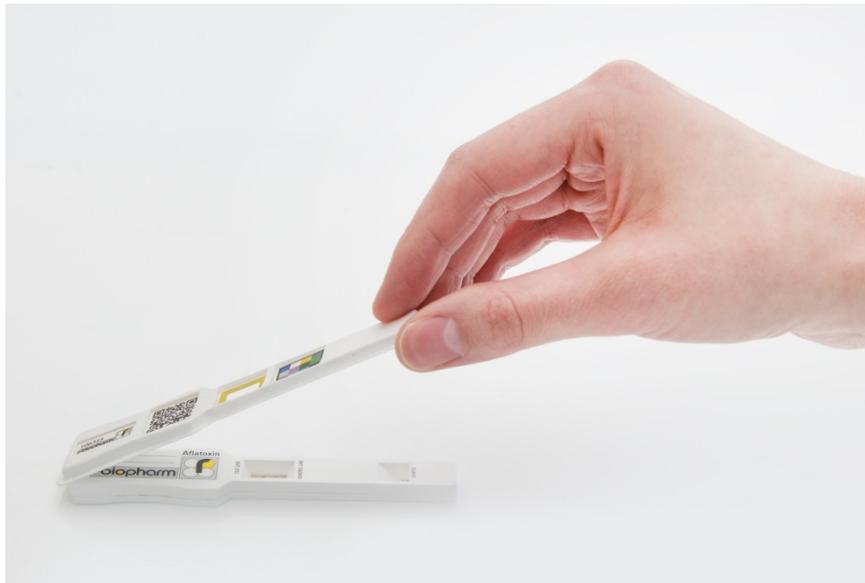- Regístrese y active su licencia: http://app.r-biopharm.com

Analice - Escanee - Envíe
RIDA®SMART APP

Cómo generar resultados con el RIDA®SMART APP

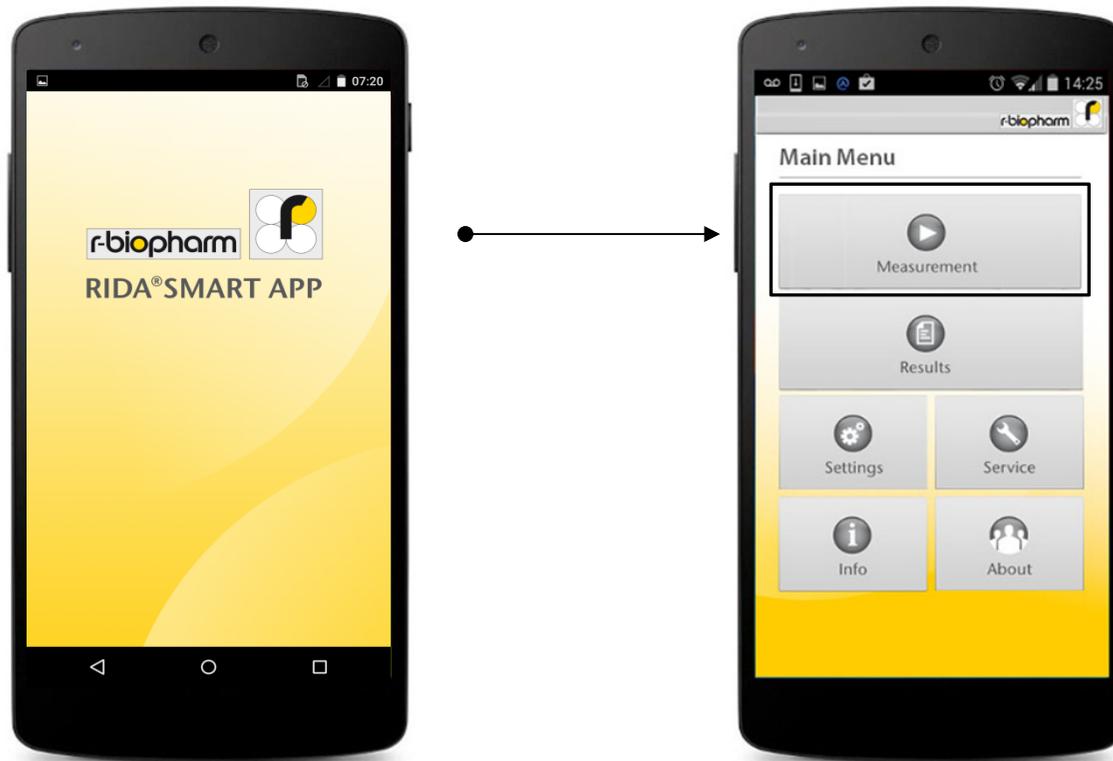**Análisis** (ej. Aflatoxinas totales con el kit RIDA®QUICK Aflatoxin RQS ECO)

Luego del ensayo

Coloque la cubierta del RIDA®SMART APP sobre la tira del ensayo

Cada kit de RIDA®QUICK micotoxina trae su propia cubierta
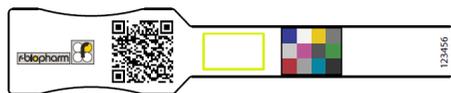
Lectura

Lectura

Defina su muestra:

- Operador
- ID muestra
- ID usuario

Defina el kit de flujo lateral:

- Escanee el código QR en la cubierta para información del ensayo

Lea
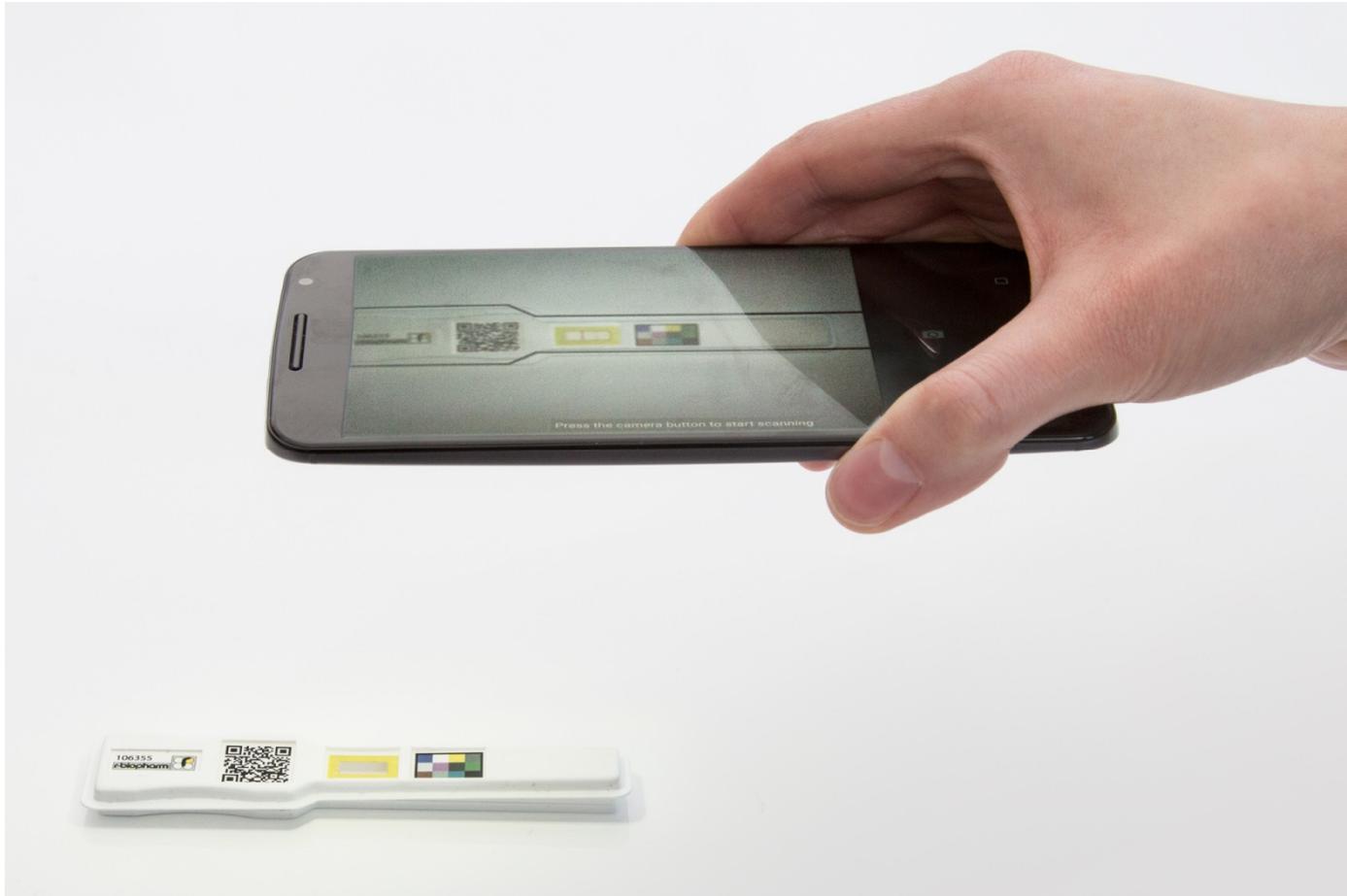
Lectura

- El resultado es evaluado por la APP y está inmediatamente disponible luego de la lectura

- El resultado se almacena automáticamente en la base de datos del RIDA®SMART APP o puede ser exportado
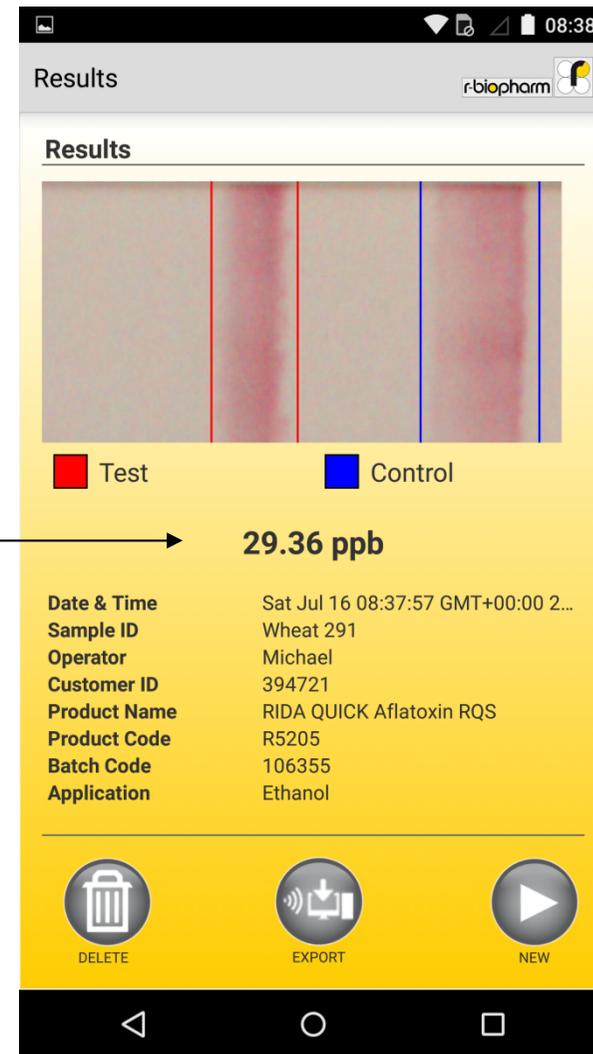
Envío de resultados
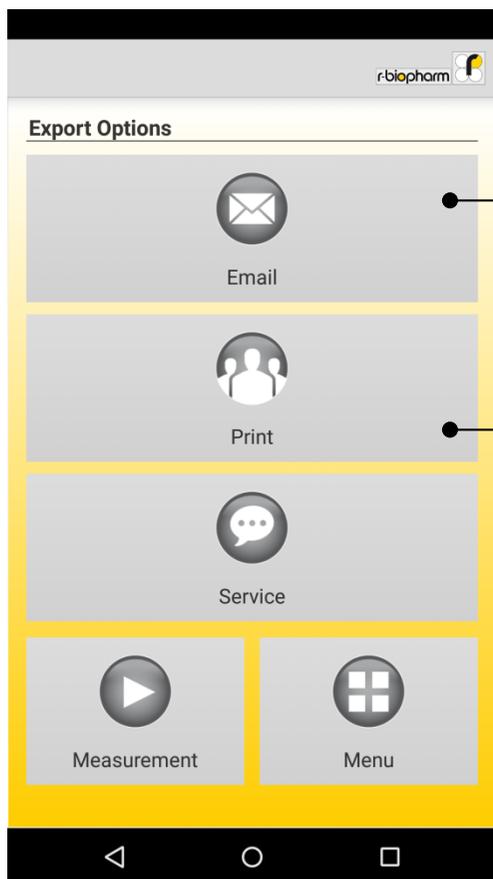
Enviar los resultados directamente luego de la medición

via email

…o luego de pedirlos a la base de datos de la RIDA® SMART APP
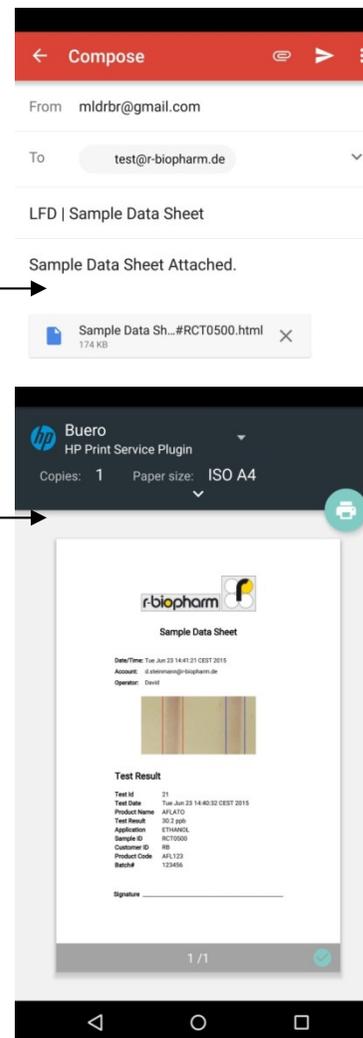
…o a cualquier impresora WiFi o bluetooth

Si, una pregunta más – Funciona?

- Hemos validado extensamente el funcionamiento de la RIDA®SMART APP. Por ejemplo el efecto de las condiciones de luz:
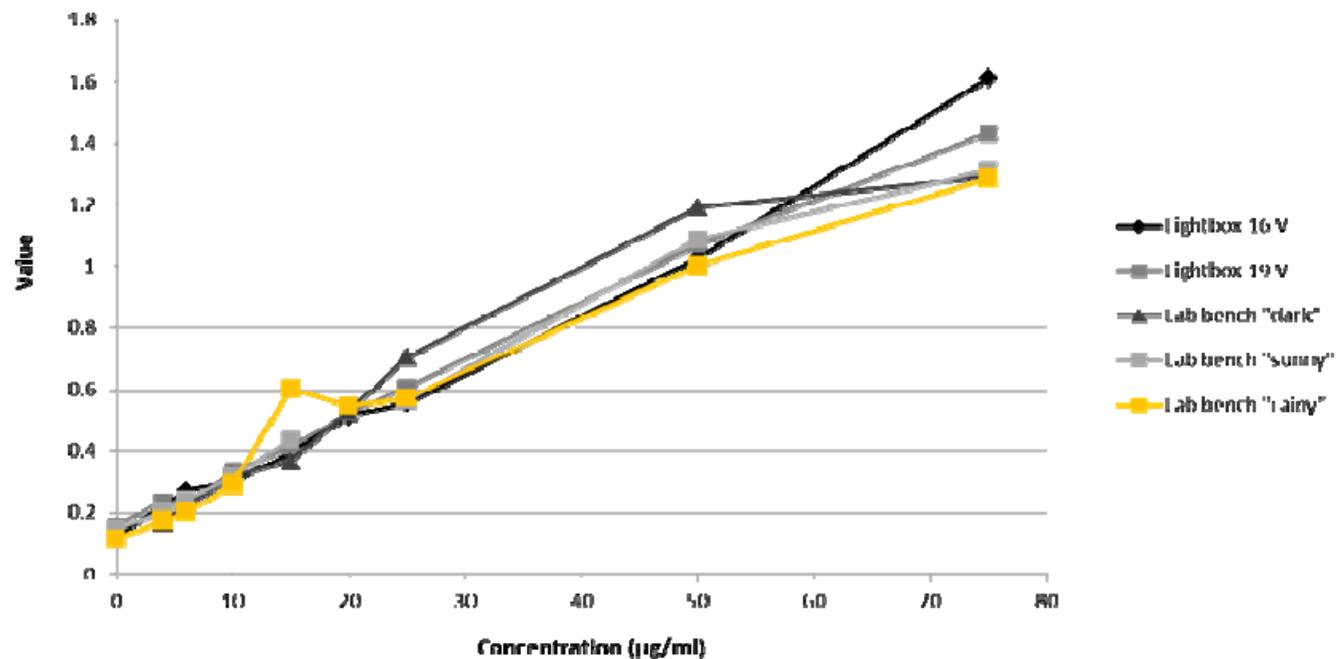
Si, una pregunta más – Funciona?

Variación inter-lector

Reader	1	2	3	4	5	6	7	8	9
Mean	4,3766	4,4435	4,2868	4,3295	4,0461	4,3897	4,2357	4,3202	4,3809
SD	0,24	0,16	0,19	0,17	0,21	0,20	0,23	0,18	0,18
CV	5,43%	3,52%	4,51%	4,02%	5,27%	4,49%	5,36%	4,09%	4,12%
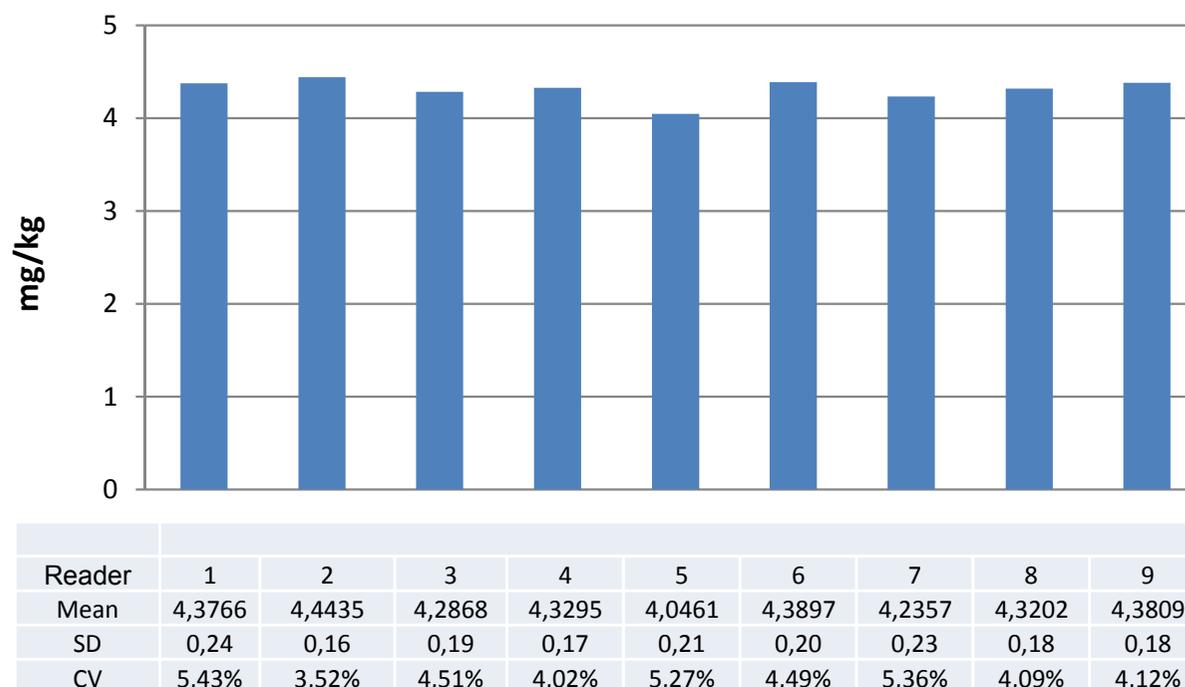
Fig 2: Variación inter-lector. Se midió 20 veces la misma tira de referencia (n=20) en cada teléfono inteligente. Para este ensayo se utilizaron teléfonos Nexus6 comprados en diferentes países de todo el mundo.

RIDA®SMART APP – on-site mycotoxin testing with smartphone-based test evaluation

Michael Fischer, David Steinmann, Verena Zimmermann, Walter Lübbe and Michael Mättner, R-Biopharm AG, Darmstadt, Germany

Introduction

Mycotoxin contaminations of food and feed have a huge economic impact and pose a serious risk to human and animal health. Mycotoxin contaminations of crops are unavoidable but mycotoxins can be managed. Monitoring mycotoxin contaminations by testing is necessary to verify that the products will meet international regulations and guidelines. Yet, instead of testing large numbers of end-products, a more pro-active approach would have many benefits. During the entire process from field to food or feed critical steps can be identified to monitor mycotoxins. For this approach a mobile, easy to use and quick tool for on-site mycotoxin testing is the optimal solution. Lateral flow-based tests are well accepted methods for this. However, for a quantitative result, a lab environment is generally required.

Aim of this study

R-Biopharm AG now presents the next generation in rapid on-site mycotoxin testing, the RIDA®SMART APP. This software application allows you to use a smartphone as a powerful and easy to handle reader for a flexible and fast mycotoxin testing with RIDA®QUICK lateral flow tests – anytime, anywhere. It scans the test strip and automatically calculates the results by analyzing the line pattern on the taken picture. Here we show data that demonstrates the accuracy and robustness of the RIDA®SMART APP software. R-Biopharm RIDA®QUICK mycotoxin tests can be evaluated reliably and fast with this innovative and highly flexible tool.

Material and methods

RIDA®QUICK DON Art. No. R5908	Trilogy® reference material (wheat)							
Target value	ND	0.5	0.9	1.6	2.1	3.5	4.5	6.2
Recovery [%]	-	106	93	93	100	95	104	93
	Trilogy® reference material (corn)							
Target value	ND	0.5	1.1	1.9	2.7	3.6	4.8	6.2
Recovery [%]	-	113	104	102	105	100	104	97
RIDA®QUICK Aflatoxin RQS Art. No. R5205	Trilogy® reference material (corn)							
Target value	ND	1.7	5.9	14.3	20.2	31.6	50.8	98.7
Recovery [%]	-	-	97	110	104	106	96	82
RIDA®QUICK Aflatoxin RQS ECO Art. No. R5206	Trilogy® reference material (corn)							
Target value	ND	1.7	5.9	14.3	20.2	31.6	50.8	98.7
Recovery [%]	-	-	88	84	93	88	100	97
RIDA®QUICK Zearalenon RQS Art. No. R5504	Trilogy® reference material (corn)							
Target value	ND	59	88	121	165	267	472	1021
Recovery [%]	-	73	117	121	111	86	82	84
RIDA®QUICK Fumonisin RQS Art. No. R5606	Trilogy® reference material (corn)							
Target value	ND	0.6	1.0	2.2	3.2	6.8	9.2	12.5
Recovery [%]	-	92	111	98	94	101	84	-
RIDA®QUICK T-2 / HT-2 RQS Art. No. R5304	Oats sample (for spike level see target values)							
Target value	ND	50	100	200	400	600	800	1000
Recovery [%]	-	103	113	96	93	93	92	91

Fig. 1: Recovery of RIDA®QUICK mycotoxin test strips analyzed with RIDA®SMART APP

We analyzed Trilogy® reference material with all available R-Biopharm AG quantitative RIDA®QUICK mycotoxin lateral flow tests and evaluated the results with the RIDA®SMART APP software installed on commercially available NEXUS 6 smartphones. Here we show representative recovery data of all RIDA®QUICK mycotoxin tests as well as information on the minimal influence of surrounding light conditions on the test results. We also demonstrate the consistency of results of the RIDA®SMART APP software when it is installed on NEXUS 6 smartphones from different sources. For this we purchased nine phones from around the world and compared results that were generated by using a reference test strip.

R-Biopharm quantitative RIDA®QUICK tests were performed according to instructions for use and evaluated with RIDA®SMART APP. As samples naturally contaminated Trilogy® reference materials were used. Certified contamination values were set as target values. For the analysis of oats with RIDA®QUICK T-2 / HT2 RQS, spiking experiments were performed since no Trilogy® reference materials were available. Non-detect (ND) samples were defined as such by Trilogy® (by HPLC or LC-MS/MS values below the detection limit). Recovery values are given as (-) if samples tested with a RIDA®QUICK test and evaluated with RIDA®SMART APP gave results below the detection limit or above the upper end of the measurement range. Representative example data is shown in the table below as recovery values, given in percent (%).
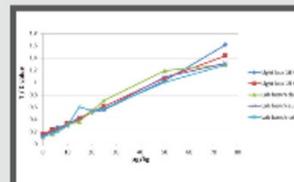

Fig. 2: Influence of different light conditions

Fig. 3: Inter reader variation

To validate influence of different light conditions on RIDA®SMART APP results Trilogy® reference materials were tested according to instructions for use and evaluated with RIDA®SMART APP installed on a Nexus 6 smartphone. The graph shows results of aflatoxin ND (non-detect) samples and samples contaminated with Aflatoxin (max. level 75 µg/kg) analyzed with a commercially available lot of R-Biopharm RIDA®QUICK Aflatoxin RQS lateral flow test. Values were generated by using one NEXUS 6 phone. The same extracts were used at different light conditions. Light conditions were as follows: a) light box 16V, b) lightbox 19V, c) lab bench dark (closed blinds), d) lab bench sunny (open blinds, sunlight), e) lab bench rainy (open blinds, rainy day). The individual lines show the consistency of the 5 recorded curves under different light conditions and controlled as well as non-controlled environments. X-axis shows the target values of the reference materials. Y-axis shows the ratio of the color intensity of test line to control line.

To validate the inter reader variation of NEXUS 6 smartphones nine individual phones (reader) have been tested on the same reference strip (tests strip showing a consistent line pattern) and under the same conditions. Results are given as mg/kg. Standard deviations (SD) and the coefficients of variation (CV) of the measured values were calculated (n=20) for each NEXUS 6. The coefficients of variation were between 3.52 % and 5.43 % and the results were very consistant. All measurements were performed under controlled conditions (Light Box 19V).

Conclusion

We were not only able to demonstrate that the innovative evaluation tool RIDA®SMART APP gives accurate and precise results under controlled light conditions by showing very good recoveries with Trilogy® reference material. We also show that the RIDA®SMART APP software is a reliable tool to work in a non-controlled environment. The software generates reliable results in combination with all quantitative R-Biopharm RIDA®QUICK mycotoxin tests available on the US market.
Additional to that powerful features turns this software into a fast, valuable and cost-effective alternative to conventional lateral flow readers. Results are automatically stored in the internal application database and reports can be recalled any time. By using the connectivity options of the smartphone results can be exported via Wi-Fi or Bluetooth to connected network printers. Optional, results can be send by E-Mail from any production side worldwide. A Nexus Smartphone with installed RIDA®SMART APP software is a highly mobile lateral flow evaluation device that is independent from any power supply. This makes it an optimal tool for testing in combination with lateral flow mycotoxin tests – mobile, fast, accurate.

Tasas de recuperación

Fig 2: Tasas de recuperación. Se analizaron Materiales de Referencia de Trilogy® con todos los kits de flujo lateral de R-Biopharm en el RIDA®SMART APP. Las concentraciones de micotoxinas de los materiales de referencia en los certificados fueron los valores blanco.

RIDA®QUICK DON (Art. No. R5908)	Trilogy® reference material (wheat)						
Target value	ND	0.5	0.9	1.6	2.1	3.5	4.5	6.2
Recovery [%]	-	106	93	93	100	95	104	93
	Trilogy® reference material (corn)						
Target value	ND	0.5	1.1	1.9	2.7	3.6	4.8	6.2
Recovery [%]	-	113	104	102	105	100	104	97
RIDA®QUICK Aflatoxin RQS (Art. No. R5205)	Trilogy® reference material (corn)						
Target value	ND	1.7	5.9	14.3	20.2	31.6	50.8	98.7
Recovery [%]	-	-	97	110	104	106	96	82
RIDA®QUICK Aflatoxin RQS ECO (Art. No. R5206)	Trilogy® reference material (corn)						
Target value	ND	1.7	5.9	14.3	20.2	31.6	50.8	98.7
Recovery [%]	-	-	88	84	93	88	100	97
RIDA®QUICK Zearalenon RQS (Art. No. R5504)	Trilogy® reference material (corn)						
Target value	ND	59	88	121	165	267	472	1021
Recovery [%]	-	73	117	121	111	86	82	84
RIDA®QUICK Fumonisin RQS (Art. No. R5606)	Trilogy® reference material (corn)						
Target value	ND	0.6	1.0	2.2	3.2	6.8	9.2	12.5
Recovery [%]	-	92	111	98	94	101	84	-
RIDA®QUICK T-2 / HT-2 RQS (Art. No. R5304)	Oats sample (for spike level see target values)						
Target value	ND	50	100	200	400	600	800	1000
Recovery [%]	-	103	113	96	93	93	92	91

Si, una pregunta más – Funciona?

- Nosotros validamos el RIDA®SMART APP utilizando Materiales certificados de referencia de micotoxinas de Trilogy. Acá hay algunos datos para Aflatoxina (comparados con la lectura en el lector RIDA®QUICK SCAN):

Material de referencia de Trilogy	Valor de Referencia	Resultados	
		RIDA®QUICK SCAN	RIDA®SMART APP
AC-215	Blanco	<4 µg/kg	<4 µg/kg
AC-285	5,9 µg/kg	4.5 µg/kg	5.2 µg/kg
AC-2203	11,1 µg/kg	13,2 µg/kg	10,8 µg/kg
AC-286	20,2 µg/kg	23,4 µg/kg	20,5 µg/kg
AC-290	32,2 µg/kg	26,7 µg/kg	26,1 µg/kg

- Hay más datos disponibles por pedido – para contestar la pregunta: Si, funciona!
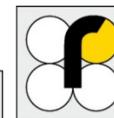
Kits RIDA®QUICK micotoxinas compatibles

Compatible con todos los ensayos cuantitativos RIDA®QUICK micotoxinas de flujo lateral

Aqueous extraction

Product	Article number	Test implementation	Detection range	
			RIDA®SMART APP	RIDA®QUICK SCAN
RIDA®QUICK Aflatoxin RQS ECO	R5206	5 min	4 - 100 µg/kg	4 - 100 µg/kg
RIDA®QUICK DON	R5904	5 min	500 - 5500 µg/kg	500 - 5500 µg/kg
RIDA®QUICK Fumonisin RQS	R5606	5 min	300 - 10000 µg/kg	300 - 10000 µg/kg
RIDA®QUICK T-2 / HT-2 RQS	R5304	5 min	50 - 10000 µg/kg	50 - 8000 µg/kg

Ethanol/methanol extraction

Product	Article number	Test implementation	Detection range	
			RIDA®SMART APP	RIDA®QUICK SCAN
RIDA®QUICK Aflatoxin RQS	R5205	5 min	4 - 100 µg/kg	4 - 100 µg/kg
RIDA®QUICK Zearalenon RQS	R5504	5 min	50 - 1000 µg/kg	75 - 500 µg/kg

RIDA®QUICK – formato cuantitativo

Producto	Preparación de muestra (10 muestras)	Duración del ensayo	Matrices
RIDA®QUICK Aflatoxin RQS	10 min	5 min	Maíz, trigo*, arroz*, frutos secos*, maní*, nueces*
RIDA®QUICK DON	10 min	5 min	Maíz, trigo, triticales, avena*, cebada*
RIDA®QUICK Fumonisin RQS	10 min	5 min	Maíz
RIDA®QUICK Zearalenon RQS	10 min	5 min	Maíz
RIDA®QUICK T-2 / HT-2 RQS	10 min	5 min	Avena, maíz, trigo
RIDA®QUICK Aflatoxin RQS ECO	10 min	5 min	Maíz

Formato de ensayo: 20 tiras, solvente móvil, evaluación con RIDA®QUICK SCAN o RIDA®SMART APP

Estándares: banda control interno en la tira

Preparación de muestra: homogeneizar, extraer

* Nota de Aplicación disponible (LOD puede ser diferente)

Ⓐ = extracción acuosa

Características y teléfonos inteligentes compatibles

- **Base de datos de resultados interna**
  Los resultados se almacenan en la base de datos del RIDA®SMART APP y se pueden recuperar en cualquier momento

- **Modo serie y asignación automática de ID de la muestra**
  Opciones para altos volúmenes de muestras

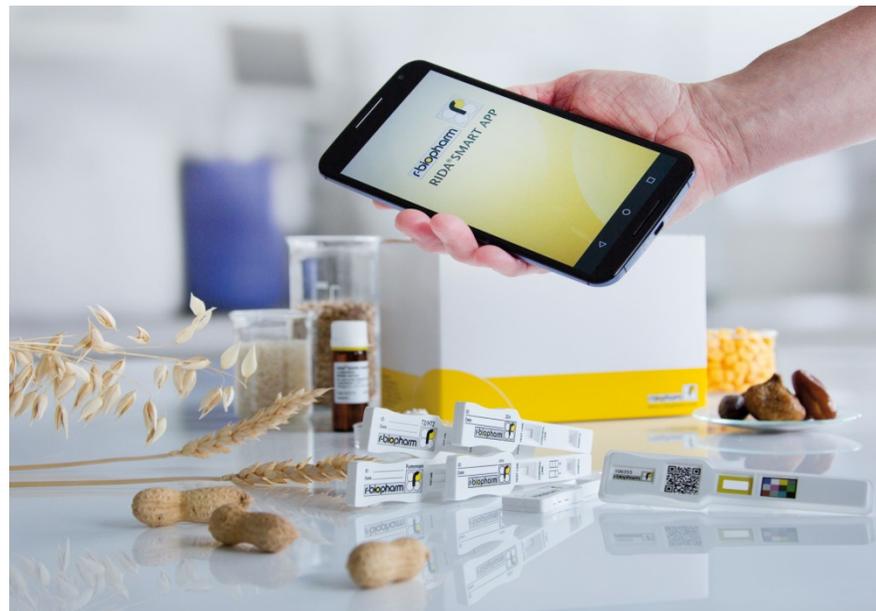- **Función de Solicitud de Servicio instalada**
  Enviar la solicitud de servicio vía el teléfono inteligente

- **Plataforma de Teléfono Inteligente (Smartphone platform)**
  Google Inc. Nexus 6, Nexus 6P

Análisis de micotoxinas con kits RIDA®QUICK y RIDA®SMART APP

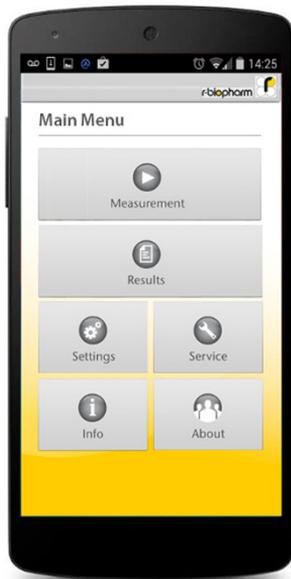**La combinación óptima para ensayos de rastreo in-situ**

Económico   Exporta resultados vía WiFi/BT

Rápido y confiable   Análisis en cualquier lugar y momento

Estos son muy Buenos lectores de flujo lateral.
Pero cuál es la diferencia entre ambos?

Con el RIDA® SMART APP usted puede:

• Leer y evaluar ensayos de micotoxinas en cualquier momento, en cualquier lugar

• Enviar e imprimir los resultados – en línea desde cualquier lugar

• Acceder (online) a soporte técnico

•Hasta nos puedes llamar ☺

Lea inteligentemente. Sea inteligente.
Con el RIDA®SMART APP

- Soporte de teléfono inteligente de R-Biopharm

Gracias
Más información?

app.r-biopharm.com

www.r-biopharm.com