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WELCOME TO ICENS 2021

On behalf of the organizing committee, we are pleased to announce that the 6th International Conference on Engineering and Natural Sciences (ICENS 2021) held from June 23 To 27, 2021 (Hybrid Conference). ICENS provides an ideal academic platform for researchers to present the latest research findings and describe emerging technologies, and directions in Engineering and Natural Sciences issues. The conference seeks to contribute to presenting novel research results in all aspects of Engineering and Natural Sciences. The conference aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results about all aspects of Engineering and Natural Sciences. It also provides the premier interdisciplinary forum for scientists, engineers, and practitioners to present their latest research results, ideas, developments, and applications in all areas of Engineering and Natural Sciences. The conference will bring together leading academic scientists, researchers and scholars in the domain of interest from around the world. The scientific program will focus on current advances in the research, production and use of Engineering and Natural Sciences with particular focus on their role in maintaining academic level in Engineering and Applied Sciences and elevating the science level. The conference's goal will to provide a scientific forum for all international prestige scholars around the world and enable the interactive exchange of state-of-the-art knowledge. The conference will focus on evidence-based benefits proven in clinical trials and scientific experiments.

Best regards,
Prof. Dr.Özer ÇINAR

ICENS 7TH INTERNATIONAL CONFERENCE ON ENGINEERING AND NATURAL SCIENCE
June 23-27 2021 (Hybrid Conference)

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Validation of QuEChERS Method for the Analyses of Chlorpyrifos-methyl, Lambda-cyhalothrin andTebuconazole Residues in Grapes*

Aysegul Duman[1], Osman Tiryaki[2]

Abstract

Method validation (MV) is an important quality parameter in pesticide residue analyses and has a direct impact on the quality of data. MV is the process of verifying that a method is fit for purpose All methods used in pesticide analyses must be validated prior to original samples. Working with validated methods is also a basic requirement in ISO 17025 and OECD - GLP quality systems. This study was carried out to validate QuEChERS Official Method 2007.01 method using grapes spiked at 0.1 x MRL, 1 x MRL and 10 x MRL levels of the three (chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole) pesticides. For the extraction and cleanup, QuEChERS 2007.1 version was followed, then the samples were subjected to LC-MS/MS for chromatography. For the quantification represenative (apple) matrix-matched calibration (MC) was used to compansate matrix effect. Detection limit of three pesticides blow the EU-MRLs. The recovery ranges were 91.3%-131.4% (mean 114.80%), 85.8%-133.2% (mean 108.05%), 90.3%-111.6% (mean 102.96) for chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole, respectively. The overall recovery of the QuEChERS method was 108.6% with a relative standard deviation (RSD) of 11.8% (n= 108). These figures are within the recovery limits (60-140%) and the values specified for the repeatability (RSD ≤ 20%). %). The calibration curves of three pesticides were linear (R≥0.999). Precision, accuracy and linearity were also within the required limits. All the required method validation criteria were met in this study. QuEChERS method was found suitable for the analyses of chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole residues in grape under our laboratory conditions.

Keywords: Grape, method validation, pesticide residue, QuEChERS Official Method 2007.01

1.INTRODUCTION

Pesticides are the most critical component of agriculture and will constitute an important input of agriculture in the future. Agricultural foods should not include any pesticide or should have residues less than specified MRL [1].

QuEChERS method is developed by Anastassiades et all [2] and has been used for the analysis of a large number of pesticides in a wide variety of agricultural product. Modification of QuEChERS method was used in this study [3].

According to SANCO/SANTE Guidelines method validation (MV) is an important quality parameter in pesticide residue analyses and has a direct impact on the quality of data. MV is the process of verifying that a method is fit for purpose. MV shows most common potential problems in the method. All methods used in

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pesticide residue analysis must be validated prior to original laboratory samples. Working with validated methods is also a basic requirement in ISO 17025 and OECD - GLP quality systems. Despite the widespread use of the QuEChERS method in well-equipped laboratories, there is still a need for validation for local conditions of any laboratories. Recovery limit was specified in SANTE Guidelines as 60-140% with the RSD ≤ 20% [4], [5], [6], [7],[8].

The world grape production is about 79.1 Mt in 2018. With an annual production of 4.100.000 tons, Turkey has the 6th place in world grape production. About 83% of grape exported from Turkey is sent to EU (European Union) countries. Grape and its processed products are extensively consumed all over the world [9].

This study focused to validate analytical procedure for chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole residues in grape. Spiked grape samples were analysed with QuEChERS method, followed by determination using LC-MS/MS. The the validity of the method were also performed by method-validation parameters ([6]-[7], [8]).

2.MATERIALS AND METHOD

○ *Material*

2.1.1. Reagents and Chemicals

Chlorpyrifos-methyl, lambda-cyhalohtrin and tebuconazole pesticide standards were supplied from Dr. Ehrenstorfer Laboratories GmbH, Germany, with the purity of 98.73%, 98.6% and 99.69%, respectively. Some physicochemical and toxicological properties of pesticides are given in Table 1. $MgSO_4*7H_2O$, sodium acetate (NaAC), acetonitrile (MeCN), methanol (MeOH) were supplied from Merck, with the purity of 99.5%, 99.0%, 99.9%, 99.0% and 99.9%, respectively. PSA (Primary-secondary amine 40 µm, 100 g) was sourced from Agilent (Santa Clara, CA, USA).

2.1.2. Instrumentation

Chromatographic analyses were carried out with LC-MS/MS (Waters I Class Plus UPLC + Xevo TQ-S micro MS Detector) equipped with Acquity UPLC BEH C_{18} column (1.7 µm, 2.1 mm x 100 mm). Injection volume, flow rate and total run time were 1 µL, 0.35 mL/min and 15 min, respectively. Centrifuge (Hettich EBA 280, 4500 rpm), 50 mL Falcon tubes, price balance (Shimadzu), vortex (VELP scientifica), Waring blender, glass GC vials (1.5 mL) and other glassware used in the study.

Table 1. Physicochemical and toxicological properties of the fungicide of some pesticides

Parameters	Chlorpyrifos-methyl	Lambda-cyhalothrin	Tecuconazole
Chemical formula	$C_7H_7Cl_3NO_3PS$	$C_{23}H_{19}ClF_3NO_3$	$C_{16}H_{22}ClN_3O$
Group	Organophosphates	Pyrethroids	Triazole
Mode of action	Non-systemic acetylcholinesterase (AChE) inhibitors nerve action	Non-systemic sodium channel modulatorsnerve action	Systemic with protective, curative and eradicant action.
Physicochemical property			
LogP: Octanol-water partition coefficient at pH 7, 20 °C	4.7	5.5	3.7
Solubility - In water at 20 °C (mg/L)	2.74	0.005	36
Melting point (°C)	46	49.2	105

Boiling point (°C)	Decomposes before boiling	Decomposes before boiling	Decomposes before boiling
Degradation point (°C)	175	275	350
Molecular mass (g/mol)	322.53	449.85	307.82
GUS index	0.08	-2.09	1.86
Toxicological property			
ADI: Acceptable Daily Intake (mg/kg/bw/day)	0.01000	0.0025	0.0300
EU MRL (mg/kg)	1.0	0.08	0.5
ARfD: Acute Reference Dose (mg/kg/bw/day)	0.100	0.005	0.030
MPI: The maximum amount permitted to be taken daily (mg / person / day)	0.60	0.15	1.80
Mammals - Acute oral LD_{50} (mg/kg)	5000	56	1700
Mammals - Dermal LD_{50} (mg/kg)	2000	632	2000
Mammals - Inhalation LC_{50} (mg/L)	>0.670	0.066	> 5.090
Koc	4645	283707	-
WHO Classification *	III	II	II
Health issues	Reproductive / Growth effects Neurotoxic Cholinesterase inhibitor	Endocrine disruptor Eye irritant Skin irritant	Reproductive / growth effects, eye irritant

* II, moderately hazardous; III, Less hazardous

2.1.3. Preparation of standard solution and fortification solution

Chlorpyrifos-M, lambda-cyhalothrin and tebuconazole stock solutions of 400 µg/mL were prepared with toluene. Working standard solutions (1.0 µg/mL) of 3 pesticides was obtained from stock solution by serial dilutions. Calibration solutions were prepared in MeCN with the range of 20-4000 pg / µL, 10-2000 pg / µL and 1-200 pg / µL , for chlorpyrifos-M, lambda-cyhalothrin and tebuconazole , repectively. For matrix-matched calibration (6 level), a representative commodity (apple) was used ([8],[10]). Fortification standard solutions were also prepared, corresponding to 0.1 x MRL, 1.0 x MRL and 10.0 x MRL levels. Spiking level of 10 times MRL were diluted to fit calibration.

2.1.4.Fortification trials and analyses

According to EU Guide [11] 1 kg of blank (pesticides free sample) grape sample homogenized with blender. 15 g homogenized sample spiked with 100 µL MeCN mixed above mentioned pesticide fortification solutions (Table 2). Tubes vortexed for 30 s and will left for 15 min for matrix penetration. Four analytical portions of

15 g was taken from each spiking level. Analysis of samples was performed with AOAC Method 2007.01 and LC-MS/MS. Schematic diagram of the method are illustrated in Figure 1.

Table 2. Spiking levels for chlorpyrifos-methyl, lambda-cyhalothrin, tebuconazole.

		Spiking levels µg/kg		
Fortification level	Code	Chlorpyrifos-methyl	Lambda-cyhalothrin	Tebuconazole,
0.1 X MRL	F1/1-4	100	8	50
1 X MRL(*)	F2/1-4	1000	80	500
10 X MRL	F3/1-4	10000	800	5000
Control	F0/1-3			

(*)EU MRL, µg/kg

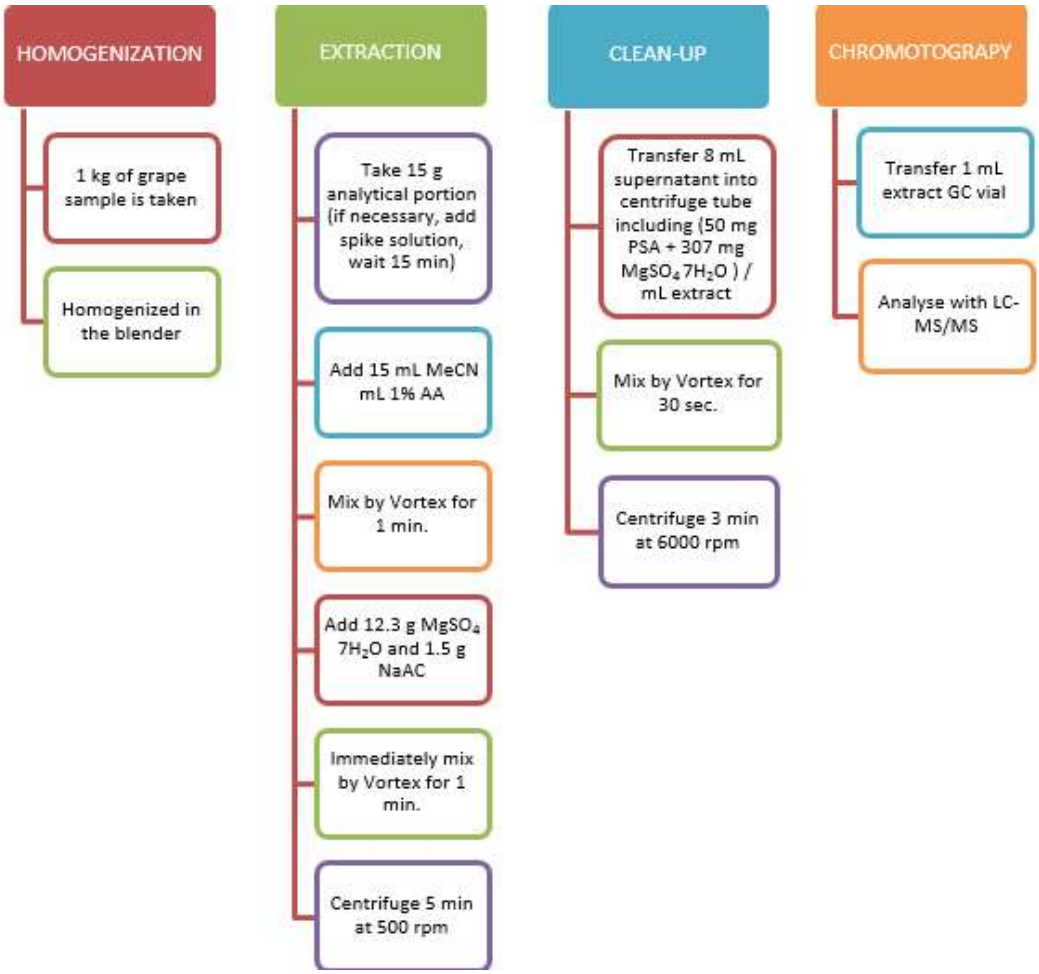


Figure 1. Schematic presentation of QuEChERS-AOAC Official Method 2007.01.

2.2 Method

2.2.1. Method validation

Validation of the method for chlorpyrifos-M ,lambda-cyhalothrin and tebuconazole residues in grape was performed by spiking at 3 concentration (0.1 x MRL, 1.0 x MRL and 10.0 x MRL levels) with 4 replicate analysis. Then the evaluation was carried out with the single method validation approach [12]. The method performance was evaluated by considering some validation criteria ([8], [13]).

3.RESULTS AND DISCUSSION

3.2. Method performance and method validation

3.2.1. Linearity

Chromatogram and calibration curve of pesticide werepresented in Figure 2. Calibration curves of chlorpyrifos-M,lambda-cyhalothrin and tebuconazole, standard in representative sample matrix were linear over the range of 20-4000 pg /µL, 10-2000 pg /µL and 1-200 pg /µL,respectively, with R2, (R2 ≥ 0.999). In matrix-matched calibrations, regression equation is known as analytical function [14]. The analytical functions of pesticides were used for quantification of the analytes.

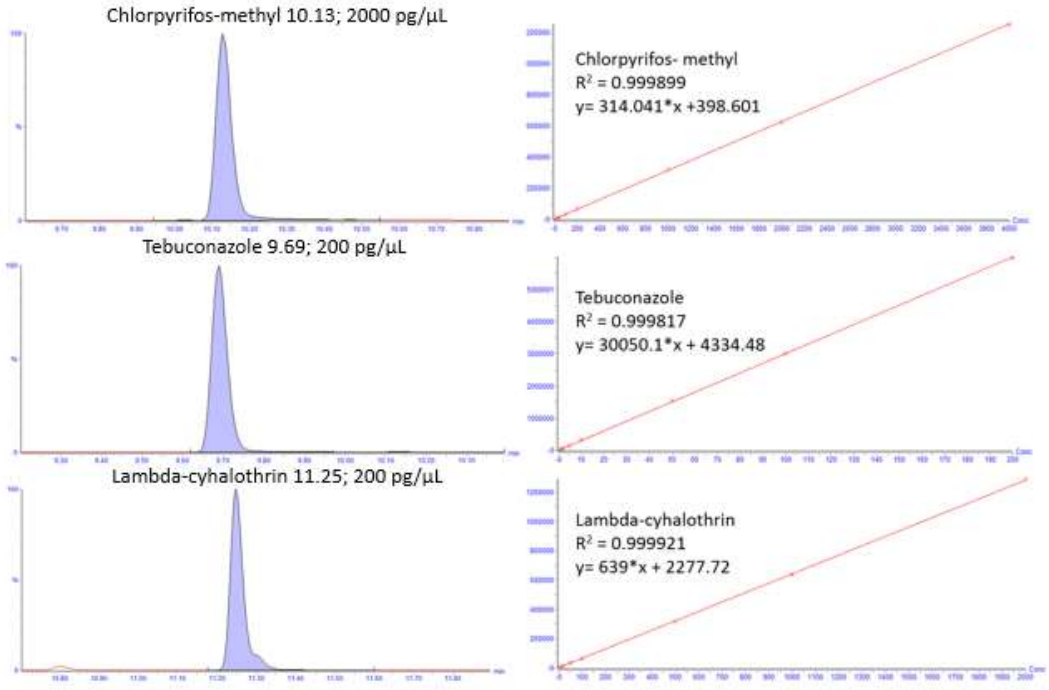


Figure 2. Chromatogram and Calibration Curve of 3 Compounds in Matrix-matched Calibration

3.2.2. Chromatographic repeatability

Chromatographic repeatability was also assessed in the study.The retention time of the compounds in the extract should correspond to that of the calibration standard with a tolerance of ±0.1 min ([8],[15]). Retention times in all calibration range of chlorpyrifos-M (20-4000 pg/µL range), lambda-cyhalothrin (10-2000 pg/µL range) and tabuconazole (1-200 pg/µL range) were 10.13, 11.25 and 9.69, respectively.

3.2.3. Detection limit (LOD)

Detection limit of chlorpyrifos-M,lambda-cyhalothrin and tebuconazole running method was 20, 10 and 1 µg/kg respectively. These figures, which is obtained from LC-MS/MS software programme, were less than MRL. MRL value of chlorpyrifos-M,lambda-cyhalothrin and tebuconazole for grapes were 1000, 80 and 500 µg/kg, respectively (Table 1).

3.2.4. Recovery, precision and accuracy

The recovery, precision and accuracy were identified in 3 parallels of analytical portions at 3 fortification levels of chlorpyrifos-methyl, lambda-cyhlothrin and tebuconazole. The recovery is the ratio of determined quantity to spiking level of the pesticide. Pesticides recoveries varied between 86-133%. The recovery ranges and mean recoveries were 91.3-131.4% (mean 114.50%), 85.8-133.2% (mean108.05%), 90.3-111.6% (mean 102.96%) for chlorpyrifos-methyl, lambda-cyhlothrin and tebuconazole, respectively. The overall recovery of the method was 108.6% with a RSD of 11.8% (n= 108). Considering the precision of the method (closeness of repeated analyses), RSD value were identified as 11.02% 14.15%, and 6.15% for chlorpyrifos-methyl lambda-cyhlothrin and tebuconazole, respectively. Overall recovery of the method, standard deviation and RSD values (n=108) were 108.6%, 12.87 and 11.85%, respectively. All individual recoveries and accuracies of 3 compound as overall recovery and repeatability as RSD were within the required limit (60% ≤ Q ≤ 40% and RSD ≤ 20%) for 3 pesticide in grape [8].Accuracy is the closeness of the measured value to actual values. Accuracy is the closeness of the measured value to actual values. Accuracy values are given in Table 3.

Table 3. Method validation criteria obtained from recovery trials with 3 fortification levels of pesticides

Analyte	Spiking ug/kg	Found ug/kg	Recovery % (As o tool for truness)	SD	RSD % (As o tool for truness)	Accuracy %
Lambda-cyhalothrin	8	9.72	121.57	16.78	13.80	
	80	77.74	97.17	7.25	7.46	
	800	843.25	105.40	8.47	8.04	
	Mean recovery, n=36		108.05	15.27	14.13	108.05
	Recovery range, 85.8-133.2%					
Chlorpyrifos-methyl	100	128.69	128.69	2.02	1.57	
	1000	1123.23	112.32	8.53	7.59	
	10000	10340.55	103.40	8.60	8.32	
	Mean recovery, n=36		114.80	12.65	11.02	114.80
	Recovery range, 91.3-131.4%					
Tebuconazole	50	54.48	108.96	2.47	2.26	
	500	501 .33	100.26	5.77	5.76	
	5000	4983.07	99.66	5.36	5.40	
	Mean recovery, n=36		102.96	6.33	6.15	102.96
	Recovery range, 90.3-111.6%					

Overall recovery of the method (accuracy of the method): 108.60% (n=108, SD=12.87, RSD=11.85);

Recovery range: 86-133%

4.CONCLUSIONS

In this study the required method validation criteria were met. QuEChERS method was found suitable to perform 3 pesticide residue analysis in grapes under our laboratory conditions the method validation revealed high performance in terms of precision (RSD), recovery and accuracy.

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REFERENCES

[1]. EC. EU Pesticide Database, http://ec.europa.eu/food/plant/pesticides/eu-pesticides database/public/?event=pesticide.residue.selection&language=EN Accessed 1 Jan 2019, 2019.
[2]. Anastassiades, M. Lehotay, S.J. Stajnbaher, D. Schenck, F.J., ‘‘Fast and easy multiresidue method employing acetonitrile extraction/partitioning and dispersive solid-phase extraction for the determination of pesticide residues in produce’’ J.AOAC Int., vol. 86, pp. 412–431, 2003.
[3]. S.J. Lehotay, ‘’Determination of pesticide residues in foods by acetonitrile extraction and partitioning with magnesium sulfate: collaborative study’’.J. AOAC Int., vol 90,pp. 485–520, 2007
[4]. P.Y. Omeroglu, D. Boyacioglu, A. Ambrus, A. Karaali, S. Saner, ‘’An Overview on steps of pesticide residue analysis and contribution of the individual steps to the measurement uncertainty ‘’ Food Analytical Methods., vol.5, pp.1469-1480, 2012.
[5]. O. Tiryaki, ‘’Method validation for the analysis of pesticide residues in grain by thin-layer chromatography’ ’Accreditation and Quality Assurance., vol 11(10), pp.506-514, 2006.
[6]. O. Tiryaki, ‘’Validation of QuEChERS Method for the determination of some pesticide residues in two apple varieties ‘’ Journal of Environmental Science and Health Part B-Pesticides Food Contaminants and Agricultural Wastes, vol.51(10), pp. 722-729, 2016.
[7]. O. Tiryaki, “Pestisit Kalinti Analizlerinde Kalite Kontrol (QC) ve Kalite Guvencesi (QA)’’, Nobel Yayinevi, p. 2, ISBN 978-605-320-604-0, 2017.
[8]. SANTE, Guidance document on analytical quality control and method validation procedures for pesticides residues analysis in food and feed. SANTE/11813/2017.
[9]. (2020) The TUIK website. [online]. Available: https://biruni.tuik.gov.tr/medas/?locale=tr
[10]. CAC, Representative commodities/samples for validation of analytical procedures for pesticide residues. In Codex Alimentarius Commission Guidelines on good laboratory practice in pesticide residue analysis. CAC/GL 40-1993. http://www.fao.org/input/download/standards/378/cxg_040e.pdf. Accessed 1 Jan 2019.
[11]. EC, Commission Directive 2002/63/EC of 11 July 2002 Establishing community methods of sampling for the official control of pesticide residues in and on products of plant and animal origin and repealing. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0063&from=EN Accessed 1 Jan 2019. 2002.
[12]. M . Thompson, S.L.R ‘’EllisonWood, R. Harmonized guidelines for single laboratory validation of methods of analysis’’ Pure Appl. Chem, vol. 74(5),pp. 835–855. 2002.
[13]. B.Kanrar, S. Mandal, A. Bhattacharyya, ‘’Validation and uncertainty analysis of a multiresidue method for 42 pesticides in made tea, tea infusion and spent leaves using ethyl acetate extraction and liquid chromatography–tandem mass spectrometry’’ J. Chromatogr, A. 1217, 1926–1933, 2010
[14]. O. Tiryaki, D. Baysoyu, E. Secer, G. Aydin, ‘’Testing the stability of pesticides during sample processing for the chlorpyrifos and malathion residue analysis in cucumber including matrix effects ‘’Bull of Environ Contam Toxico, vol. 80(1) pp. 38-43, 2008
[15]. M. Branković, D. Anđelković, H. Kocić, G. Kocić, ‘’Assessment of GC–MS response of selected pesticides in apple matrices related to matrix concentration’’ Journal of Environmental Science and Health, Part B, 2019.

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