ISSN(O): 2320-5407 | ISSN(P): 3107-4928

ISSN NO. 2320-5407

# International Journal of Advanced Research

**Publisher's Name: Jana Publication and Research LLP**

*www.journalijar.com*

## REVIEWER'S REPORT

Manuscript No.: IJAR-59104

**Title: Comparative Drying Kinetics and Moisture Diffusion of Albanian and Italian Orange Peels: A MATLAB-Based Analysis.**

**Recommendation:**
Accept as is .....
Accept after minor revision.....
Accept after major revision .....
Do not accept (*Reasons below*) .....

| Rating | Excel. | Good | Fair | Poor |
|---|---|---|---|---|
| Originality | | Good | | |
| Techn. Quality | | Good | | |
| Clarity | | Good | | |
| Significance | | Good | | |

Reviewer's ID: JPR- **115 Dr Thirunahari Ugandhar**

## *Detailed Reviewer's Report*

The study, "Comparative Drying Kinetics and Moisture Diffusion of Albanian and Italian Orange Peels: A MATLAB-Based Analysis," discusses orange peel drying kinetics, moisture diffusion, and mathematical modelling. Comparisons of temperatures, sample sizes, drying configurations, and material origins may benefit food-processing and biomass-use applications. Processing experimental drying data with MATLAB is also appropriate.

Before publishing, the work must address methodological, mathematical, statistical, and presentation difficulties. Experimental design and replication, characteristic length, equilibrium moisture content, Fickian model, and origin-related discrepancies need clarification.

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## Notable Comments

Explain experimental replication and sample sizes.

The publication does not provide how many independent samples or experimental repetitions were used for each origin, temperature, sample size, and drying method. This is crucial for measuring outcomes dependability and reproducibility. Please specify the number of repeats and if the curves are averages or individual measurements.

Give complete experimental conditions.

The thermostat type, convective dryer parameters, air velocity, relative humidity, loading density, sample arrangement, and whether samples were dried individually or in batches are absent from the drying trials. These characteristics significantly affect drying kinetics and should be reported.

**Explain sample dimensions.**

The manuscript calls 5, 10, and 15 mm "characteristic dimensions," although it is unclear if these are thickness, side length, diameter, or another geometric measurement. This information must be carefully defined because geometry and diffusion length substantially affect the Fickian model.

Reconsider Equation (3)'s typical length.

The Fickian model assumptions need more explanation.

The manuscript uses a simplified linearised Fick's second-law model. Please specify constant diffusivity, minimal external resistance, uniform starting moisture distribution, constant shape, and equilibrium boundary conditions. These assumptions may not apply to biological materials at 100–150 °C.

Explain the linear region selection for ln(MR) versus time.

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The manuscript indicates that the natural logarithm of MR was regressed against drying time, although it does not specify which experimental points were used. The calculated (D_{\mathrm{eff}}) varies greatly based on the chosen drying interval. Provide the regression interval or a clear linear portion selection criterion.

**Report regression data.**

Please include slope, intercept, (R^2), standard error, and confidence ranges for the linearised Fickian model in the text. Only qualitative assertions concerning Fick's law agreement are insufficient to prove model appropriateness.

Define equilibrium moisture content.

X_e's definition and determination should be clarified. If the final measured moisture content was equilibrium, state so. If equilibrium was determined individually for each temperature, sample size, origin, and drying configuration, please clarify.

Methodology is needed for drying-rate calculation.

The sampling interval affects discrete measurement drying rate. Please specify the equation, units, and forward, backward, or central differences. Report drying-rate curves and explain unusual measurement intervals.

Data processing in MATLAB should be repeatable.

Data from multiple studies were "forced into one matrix with missing values" is not convincing. Provide data structure, treatment of missing observations, interpolation methods, and if regression results removed missing values. Include MATLAB code or comparable pseudocode as additional information.

Improve statistical analysis.

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The text says replicate-level data was unavailable, thus inferential statistics were not performed. If the original experimental data are accessible, the writers should analyse them statistically. Report a minimum of replicate means ± standard deviation. This constraint should be highlighted if replication is unavailable.

**Avoid explaining disparities by location**.

The manuscript admits this difficulty in several places, however "these differences are best explained by the origin" is unsupported. Cultivar, maturity, storage history, composition, peel thickness, wax content, tissue structure, and other factors confuse fruit origin. Origin-associated differences, not causal geographical effects, should be described.

If accessible, include compositional or physicochemical data.

Pectin, cellulose, hemicellulose, soluble solids, wax, porosity, and tissue structure affect moisture transfer. Instead of using these aspects as explanations, confess that such measurements were not done.

High-temperature experiments demand extra prudence.

Thermal deterioration, browning, structural collapse, chemical change, and surface hardening can result after 150 °C drying. The manuscript should identify moisture removal from thermal degradation. The authors should justify 150 °C if the samples were exposed to it.

**Indicate if the temperature is air or sample.**

The sample temperature may fluctuate significantly from the prescribed temperature during first drying, especially between 100 and 150 °C. Report this distinction.

Compare thermostat and convective drying better.

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The comparison between 95 °C convective drying and 100 °C thermostat drying may be instructive, however temperature is not the only variable. Also, air movement and heat/mass-transfer coefficients differ. Thus, the 5 °C temperature difference alone cannot explain the observed differences.

Include all experiment outcomes.

The manuscript says "dried more quickly," "more variable behavior," and "matched the Fick diffusion model more closely." Numbers in tables and figures should support these claims.

Maintain consistency in moisture content, drying rate, time, sample dimension, and diffusivity units. Because diffusivity is calculated in seconds, report drying time in seconds or minutes.

**Minor Comments**

Typeface errors include "behaviouris," "Deffwere," "consideredoptimised," "high temperatures," and incomplete words. The manuscript needs extensive English editing.

Check section and equation numbers. Equation (1) is formatted wrongly in the manuscript.

Define all abbreviations, such as MR, DR, and (D_{\mathrm{eff}}), upon their first occurrence

Throughout the manuscript, use "effective moisture diffusivity" or "apparent effective moisture diffusivity," explaining why the latter is better.

Avoid the term "complete drying" unless the item has attained equilibrium moisture. "Approached equilibrium" or "mass stabilization" may be more scientific.

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Where applicable, replace "Fick diffusion behavior" with "behaviour consistent with the linearised Fickian diffusion model".

Experimental findings and hypothesised mechanisms should be clearly distinguished in the text. Without experimental measurements, shrinkage, porosity, surface hardening, and structural changes should be listed as possible reasons.

Newer research on citrus peels and other lignocellulosic/biological materials' drying kinetics and moisture diffusivity should be included in the Introduction.

Orange peel is useful for drying for food ingredients, bioactive compound extraction, pectin recovery, essential oils, animal feed, and biomass valorisation. The literature study should explain why.

New interpretations not backed by quantitative results should be avoided in the conclusion.

The article should emphasise the study's uniqueness. The authors should describe what is new by comparing Albanian and Italian orange peels using MATLAB-Fick analysis to earlier drying research.

Check the reference list to make sure all text-cited sources are included and that the journal's style is followed.

Advice for Further Analysis

Common thin-layer drying models may be used to fit the experimental drying curves:

Page model

Page model changed

Henderson–Pabis model

Midilli-Kucuk model: logarithmic

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Comparing (R^2), RMSE, and/or SSE can assist determine if the Fickian diffusion model well reflects experimental drying behaviour.

Recommendation