



COMPARATIVE ANALYSIS OF THE OILSEED CROPS IN ORGANIC SYSTEMS AREA IN THE WORLD

ANDREEA LIDIA JURJESCU¹, FLORIN SALA^{1,2*}

¹Agricultural Research and Development Station Lovrin, Lovrin, 307250, Romania

²University of Life Sciences "King Mihai I" from Timisoara, Timișoara, 300645, Romania

Abstract: The comparative analysis of the area of oilseed crops in organic systems in the world was made in the present study. With an average area of 567035 ha (37.50%), Asia occupied the first position, followed by Europe (34.45%), Africa (15.50%), North America (8.80%), and Latin America (3.75%). Moderate variability was recorded for North America (CV = 23.28), for Latin America (CV = 24.22), and for Asia (CV = 22.29), respectively. Very high variability was recorded for Europe (CV = 46.28) and for Africa (CV = 67.60). The ANOVA test indicated significant differences in the mean values ($p < 0.001$), and the Kruskal-Wallis test indicated significant differences between the median values, $H(\chi^2) = 44.94$, H_c (tie corrected) = 44.94, $p < 0.001$. The Mann-Kendall trend test indicated an increasing trend in the data series over the study period, within each continent. Compared to the multiannual average value, in the first part of the study interval, negative differences with statistical certainty were recorded, respectively positive differences with statistical certainty, towards the end of the study period.

• Introduction

Oilseed crops are important for their high oil content, and include a number of plants such as palm, rapeseed, soybean, sunflower, peanut, cotton (seeds), sesame, flax (seeds), castor, and safflower [22], [6]. The cultivated area, sustainable use and yield of these crops are of global interest, and represent a major challenge for food security [6]. Oilseed crops play an important role in human nutrition, animal feed and industrial uses [20], [1]. In organic crops and organic production, oilseed crops represent an important component worldwide [21]. Organic oilseed crops have expanded worldwide, in a differentiated manner from one continent to another, from one country to another, in relation to plant species, ecological, economic and social conditions [21], [13], [18].

Material and method

The area of oilseed crops in organic systems in the world was analyzed during the period 2013 - 2023. The study used data recorded in the FiBL database [5] for Africa, Asia, Europe, Latin America and North America. The data series were first analyzed to assess statistical reliability and the presence of variance. The variability of the data over time (coefficient of variation, CV) was evaluated. The statistical reliability was assessed in the comparative analysis of the mean and median values (ANOVA, t Test, Kruskal-Wallis test). The trend of the data variation in each data series was assessed (Mann-Kendall trend test). The comparative analysis was made between the annual values and the multiannual average value, within each data series (for each continent). To assess the reliability of the results, appropriate statistical safety parameters were used for each applied test. For the reliability of the calculated differences, the parameter thresholds $p < 0.05$, $p < 0.01$, $p < 0.001$ were used.

• Results and discussions

Based on analyzed data, Asia ranked first, with an average area of 567035 ha (37.50%), followed by Europe (34.45%), Africa (15.50%), North America (8.80%), and Latin America (3.75%), Figure 1. Statistical analysis indicated differentiated variability for oilseed areas in organic systems during the study period, according to the coefficient of variation (CV) values. Thus, moderate variability was recorded for North America (CV = 23.28), for Latin America (CV = 24.22), and for Asia (CV = 22.29), respectively. Very high variability was recorded for Europe (CV = 46.28) and for Africa (CV = 67.60). A comparative analysis of oilseed crop areas between continents was performed during the study period. The ANOVA test indicated statistical reliability in the analysis of mean values, Table 2. The comparative analysis of the areas cultivated with oilseeds in organic systems in the world was made for each continent. The results showed the differences between the annual values and the calculated multi-annual average, as well as the statistical significance of the differences.

Comparative analyses for oilseed crops have been made, in relation to organic and integrated crop systems, crop technologies, cultivated genotypes, life cycle, yields and quality of seed production, side effects through biomass content, soil quality, etc. [3], [7], [14]. The results obtained in this study showed the interest in organic oilseed crops, the cultivated area registered variations during the analysis period, but in general an increasing trend was observed.

Table 2. ANOVA Test results

Statistical Parameters	Sum of sqrs	df	Mean square	F	p (same)
Between groups	2.33E+12	4	5.81E+11	28.13	2.92E-12
Within groups	1.03E+12	50	2.07E+10	Permutation p (n=99999)	
Total	3.36E+12	54	1.00E-05		
Components of variance (only for random effects)					
Var(group)	5.10E+10	Var(error):	2.07E+10	ICC:	0.711502
omega2	0.6636				
Levene's test for homogeneity of variance, from means	p (same):	2.19E-05			
Levene's test, from medians	p (same):	0.0002526			
Welch F test in the case of unequal variances	F=56.56, df=21.62, p=3.851E-11				
Bayes factor	3.948E09 (decisive evidence for unequal means)				

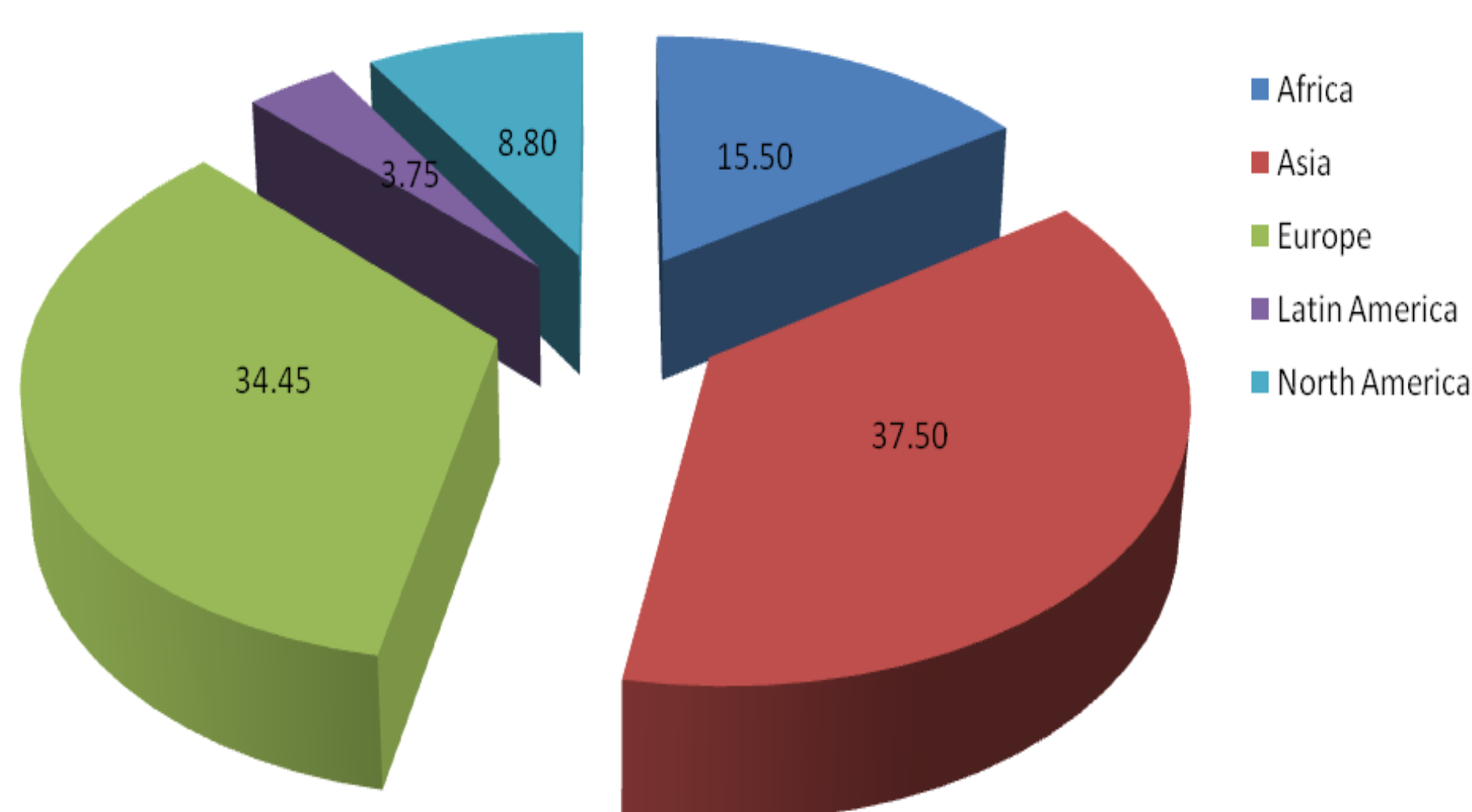


Figure 1. Share of areas cultivated with oilseeds in organic systems in the world

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• Conclusions

Differentiated temporal variability was recorded in the data series over the study period on each continent, namely very high variability for Africa (CV = 67.70), and for Europe (CV = 46.28) and moderate variability for Asia (CV = 24.29), for Latin America (CV = 24.22) and for North America (CV = 23.28). Significant differences were found between the mean values (ANOVA Test) and between the median values (Kruskal-Wallis test) calculated based on the data series for each continent, under conditions of statistical safety. The increasing trend was recorded in the data series for each continent, according to the Mann-Kendall trend test. In the first part of the study interval, negative differences were found between the annual average values and the multiannual average value at the level of each continent, and at the end of the study interval (the first year) positive differences were found, in conditions of statistical safety. The results of the study highlighted the trend of increasing the area cultivated with oilseeds in the organic system, which showed the interest in this category of crops and product categories.