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# INSTABILITY OF ROMANIA'S FRUIT PRODUCTION AND THE RESPONSIBLE FACTORS FOR THIS PHENOMENON

**GAVRILĂ VIORICA[1]**

***Abstract:****The paper offers a framework of understanding the stability/instability degree of the fruit domain's production system both at national and regional profile. We chose the utilization of Cuddy Della Valle variability index. We followed the evolution of the variability index for two different periods, respectively: 1996-2005 (P1) and the period 2006-2015 (P2). Reducing the variability index through the time is confirming the hypothesis that in case of fruit trees' orchards in our country the production's stability is greatly affected by the structural factors.*

***Key words****: production, fruits. instability*

**JEL Classification:** Q 11

## INTRODUCTION

Fluctuations in the fruit production is substantially affecting prices, the stability of the producers' incomes and implicitly the producers' engagements regarding the future investment actions.

In the specialty studies, the agricultural production stability is analysed from more perspectives for example, the relationship to the climate factors, economic factors and technological ones.

From the perspective of the relationship to the climate factors, the threat of the late spring frosts combined with more frequent gentle winters, this represents a challange even for the resistent species (Burroughs W.J., 2002).

The economic aspects include the production costs' increase, the ensurance of some constant prices or decreasing ones for the consumers, the retail sale consolidation, the decrease of the demand for certain fruits. Within the assessment of the agro-climate and pedological potential of Romania at the fruit trees' species the results show that there are few cases in which the less favorable score (1.5-2.5) was granted, and in most cases it is inscribed in the moderate favorable interval (2.5-3.5) for the fruit trees' crops.

In very few situations the scores exceed 3.5 (very favorable), from different reasons, in all cases, being imposed the potentiation of the environmental factors'low level through technological measures, irrigation being one of most important (Coman M, Chiţu E., 2014).

For the optimization of fruit production's profitability there are different agricultural protocoles: through the conventional production, through the respecting of some norms regarding durability (through the ecological production) or through intermediary systems, the so-called integrated production systems (Cerutti A, 2011).

## MATERIAL AND METHOD

In order to determine the instability degree of the present production system in the fruits' domain, we chose the utilization of the Cuddy Della Valle variability index. The index represents a modification of the variation coefficient [VC] with a flattening factor of the trends which, regularly, are present in the economic data of the time series, after the formula:

$$I_x = CV(x)\sqrt{(1 - R^2)}$$

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where :

$I_x$ = the instability index,

VC (x) =the variation coefficient,

$R^2$ =the determination coefficient.

We followed the evolution of the de variability index for two different periods, respectively: 1996-2005 (P1) and period 2006-2015 (P2).

In order to identify the instability nature in the fruits' production we took into calculation the instability degree for the yields and for the trees' number (because at regional level there is no available data regarding the areas with orchards by fruit-trees species). The variability index was calculated both for total fruits and for the more important species in the production and consumption structures. There were utilized the statistical data series from the period:.

## RESULTS AND DISCUSSIONS

In the year 2016, the orchards' area was of 138.7 thousands hectares, of which 40.1% apple orchards, 47.3% plum orchards. The other species are covering small areas, with shares in total area of: 4.4% cherries and morello cherries orchards, 2.3% pears' orchards, 1.6% those of apricots, 1.3% peaches and nectarines' orchards.

In the period 2006-2015 (P2) we can observe a positive evolution from the perspective of the increase in the fruit production stability degree, mainly due to the reduction of yields' variability. The stability increase can be explained through the elimination from the production zone of thev orchards reaching decline and manifesting a strong phenomenon of fruitage alternance and the partial replacement of these with new plantations, fact which can be seen also from the increase of the variability index value for the trees' number in P2 comparatively to P1 (Table 1).

**Table 1.** Variability of production, the yields and trees' number at national level by total fruits and by species

| Species | Index P1(1996-2005) | | | Index P2 (2006-2015) | | |
|---|---|---|---|---|---|---|
| | Production | Yield | No. trees | Production | Yield | No. trees |
| **Total fruits** | **0.26** | **0.28** | **0.01** | **0.11** | **0.14** | **0.10** |
| Plums | 0.36 | 0.34 | 0.02 | 0.15 | 0.20 | 0.17 |
| Apples | 0.37 | 0.39 | 0.01 | 0.11 | 0.10 | 0.02 |
| Pears | 0.21 | 0.20 | 0.03 | 0.12 | 0.12 | 0.05 |
| Peaches | 0.25 | 0.38 | 0.05 | 0.19 | 0.24 | 0.09 |
| Cherries and morello cherries | 0.23 | 0.29 | 0.04 | 0.15 | 0.14 | 0.04 |
| Apricots and *Prunus armeniaca* | 0.33 | 0.37 | 0.10 | 0.18 | 0.13 | 0.08 |

Source: calculations after the Tempo Online database, NSI

In the North-West region the production stability remained at a medium level, with small improvements. The most important yield increases at peach and apricot were accompanied by the variability index increase, passing from a medium to a high level. In this region, the cherry tree is the specie with the best time stability of the production and yield (Table 2).

**Table 2.** Variability of production, the yields and trees' number, by total fruits and by species in the region: North-West

| | Index P1(1996-2005) | | | Index P2 (2006-2015) | | |
|---|---|---|---|---|---|---|
| Region: North-West | Production | Yield | No. trees | Production | Yield | No. trees |
| **Total fruits - regional** | **0.26** | **0.26** | **0.05** | 0.19 | **0.22** | **0.07** |
| Plums | 0.36 | 0.33 | 0.03 | 0.24 | 0.25 | 0.09 |
| Apples | 0.33 | 0.35 | 0.08 | 0.21 | **0.26** | 0.09 |
| Pears | 0.24 | 0.24 | 0.05 | 0.17 | 0.26 | 0.14 |
| Peaches | 0.21 | 0.26 | 0.08 | **0.29** | **0.33** | 0.08 |
| Cherries and morello-cherries | 0.18 | 0.20 | 0.06 | 0.15 | 0.19 | 0.11 |
| Apricots and *Prunus armeniaca* | 0.26 | 0.22 | 0.17 | 0.40 | **0.39** | 0.09 |

Source: calculations after the Tempo Online database, NSI

In region Center, although per ensemble the areas with orchards diminished as expansion, the production stability increased in P2 comparatively to P1, mainly at pear and peach. The pear represents the species with the most reduced variability, both for the production and the yield, comparatively to the other species, but also within the regions. Although the apricot was expanded in crop, the yield is diminishing opposed to P1 and yet is registering a high yield variability (Table 3).

**Table 3.** Variability of production, yields and number of trees, by total and by species in the region: Center

| | Index P1(1996-2005) | | | Index P2 (2006-2015) | | |
|---|---|---|---|---|---|---|
| Region: Centru | Production | Yield | No. trees | Production | Yield | No. trees |
| **Total fruits - regional** | **0.34** | **0.31** | **0.03** | **0.25** | **0.22** | **0.05** |
| Plums | 0.27 | 0.28 | 0.03 | 0.38 | 0.27 | 0.18 |
| Apples | 0.48 | 0.45 | 0.05 | 0.27 | 0.27 | 0.07 |
| Pears | 0.30 | 0.25 | 0.06 | 0.11 | 0.11 | 0.13 |
| Peaches | 0.29 | 0.41 | 0.13 | 0.10 | 0.19 | 0.12 |
| Cherres and morello cherries | 0.30 | 0.30 | 0.06 | 0.18 | 0.18 | 0.09 |
| Apricots and *Prunus armeniaca* | 0.53 | 0.47 | 0.16 | 0.25 | 0.30 | 0.17 |

Source: calculations after the Tempo Online database, NSI

In region: North-East in the interval 1996-2005 (P1) the total fruits production is characterized by a medium variability level. The total fruits production stability was maintained in the following period, too, mainly through the yield's stabilization.

From the production stability perspective the best evolution was registered at apple, which passed from a high to a reduced stability, even this thing was realized also through the reduction of the trees number and production. A positive aspect is registered at the peaches' production, where the productivity increases were accompanied by a reduction of the production and yield's variability. If the pears production maintains the variability degree through the time at a medium level, the cherries production has become more volatile. This evolution is explained by the dynamics of the trees' number and less through the yields' variability. In evolution, the plum is the deficitary species in this region. (Table 4).

**Table 4.** Variability of production, yields and trees' number, by total and by species in the region: North-East

| | Index P1(1996-2005) | | | Index P2 (2006-2015) | | |
|---|---|---|---|---|---|---|
| Region North-East | Production | Yield | No. trees | Production | Yield | No. trees |
| **Total fruits - regional** | **0.21** | **0.20** | **0.04** | **0.20** | **0.14** | **0.07** |
| Plums | 0.22 | 0.17 | 0.04 | 0.43 | 0.26 | 0.17 |
| Apples | 0.46 | 0.44 | 0.06 | 0.14 | 0.13 | 0.05 |
| Pears | 0.18 | 0.14 | 0.04 | 0.19 | 0.12 | 0.15 |
| Peaches | 0.26 | 0.38 | 0.22 | 0.18 | 0.19 | 0.09 |
| Cherries and morello cherries | 0.23 | 0.23 | 0.05 | 0.29 | 0.18 | 0.11 |
| Apricots and *Prunus armeniaca* | 0.39 | 0.32 | 0.22 | 0.35 | 0.24 | 0.55 |

Source: calculations after the Tempo Online database, NSI

In region: South-East, the elimination from crop of the old orchards has brought an important contribution in the increase of stability degree of the productions and yields, passing from a high variability of production and yields to one of medium level for all the analysed species (Table 5).

**Table 5.**

Variability of production, yields and trees' number, by total and by species in the Region: South-East

| | Index P1(1996-2005) | | | Index P2 (2006-2015) | | |
|---|---|---|---|---|---|---|
| Region: South -East | Production | Yield | No. trees | Production | Yield | No. trees |
| **Total fruits -regional** | **0.34** | **0.36** | **0.04** | **0.16** | **0.14** | **0.04** |

| | | | | | | |
|---|---|---|---|---|---|---|
| Plums | 0.55 | 0.52 | 0.04 | 0.27 | 0.23 | 0.07 |
| Apples | 0.33 | 0.35 | 0.07 | 0.19 | 0.18 | 0.05 |
| Pears | 0.36 | 0.34 | 0.07 | 0.17 | 0.13 | 0.09 |
| Peaches | 0.38 | 0.49 | 0.13 | 0.29 | 0.28 | 0.16 |
| Cherries and morello-cherries | 0.31 | 0.34 | 0.06 | 0.21 | 0.17 | 0.08 |
| Apricots and *Prunus armeniaca* | 0.36 | 0.39 | 0.11 | 0.29 | 0.25 | 0.14 |

Source: calculations after the Tempo Online database , NSI

In Region: South-Muntenia, the variability of total fruits production was reduced by more than one half in the second analysed period. Although the importance of the region as a peaches' producer is a reduced one (6% from total country), in this region the production and the yield at peaches are among most stable. Also, both total peaches' production and the yield are registering the lowest variability index. The plum remains the specie with a high variability level of the yield, but production has become more stable on the background of expanding in crop (Table l 6).

**Table 6.** Variability of production, yields and trees' number, by total and by species in the Region: South-Muntenia

| | Index P1(1996-2005) | | | Index P2 (2006-2015) | | |
|---|---|---|---|---|---|---|
| Region: South -Muntenia | Production | Yield | No. trees | Production | Yield | No. trees |
| **Total fruits - regional** | **0.37** | **0.39** | **0.04** | **0.16** | **0.26** | **0.37** |
| Plums | 0.53 | 0.53 | 0.02 | 0.21 | 0.34 | 0.60 |
| Apples | 0.37 | 0.40 | 0.03 | 0.19 | 0.17 | 0.11 |
| Pears | 0.26 | 0.27 | 0.04 | 0.19 | 0.18 | 0.06 |
| Peaches | 0.41 | 0.43 | 0.20 | **0.11** | **0.12** | 0.10 |
| Cherries and morello cherries | 0.31 | 0.28 | 0.20 | **0.15** | **0.16** | 0.08 |
| Apricots and *Prunus armeniaca* | 0.32 | 0.31 | 0.38 | **0.16** | **0.13** | 0.14 |

Source: calculations after the Tempo Online database, NSI

The evolution of Bucharest-Ilfov Region as a fruit producer is a negative one, with important areas' reductions and production losses for all species, but also an increase of the yield at main species (pears, peaches, cherries/morello cherries and apricots). It is the only region in which there has taken place a significant increase of the yields and production variability. Comparatively to the other regions, here there are registered the highest variability indices from the period 2006-2015, less for the apples (Table 7).

**Table 7.** Variabiliy of production, yields and trees' number, by total and by species in the Region: Bucharest-Ilfov

| | Index P1(1996-2005) | | | Index P2 (2006-2015) | | |
|---|---|---|---|---|---|---|
| Region Bucharest - Ilfov | Production | Yield | No. trees | Production | Yield | No. trees |
| **Total fruits- regional** | **0.19** | **0.29** | **0.08** | **0.39** | **0.23** | **0.22** |
| Plums | 0.22 | 0.23 | 0.16 | 0.83 | 0.53 | 0.23 |
| Apples | 0.38 | 0.92 | 0.25 | 0.30 | 0.32 | 0.22 |
| Pears | 0.34 | 0.27 | 0.24 | 0.56 | 0.15 | 0.49 |
| Peaches | 0.38 | 0.29 | 0.20 | 0.52 | 0.37 | 0.44 |
| Cherries and morello cherries | 0.15 | 0.22 | 0.09 | 0.41 | 0.28 | 0.28 |
| Apricots and *Prunus armeniaca* | 0.33 | 0.28 | 0.10 | 0.35 | 0.31 | 0.48 |

Source: calculations after the Tempo Online database, NSI

In region South-West Oltenia production variability decreased for all species analysed. The total fruits production has the lowest variability index from all the regions. Region South-West Oltenia is the only region in which the plums production has a reduced variability, although the yield is not very stable. In this region the cherry/morello cherry represents the species with the best stability. Comparatively to the other regions, the cherry has the lowest variability index both for the production and for the yield (Table 8).

**Table 8.** Variability of production, yields and the trees' number, by total and by species in the Region: South -West Oltenia

| Region:SOUTH -WEST OLTENIA | Index P1(1996-2005) | | | Index P2 (2006-2015) | | |
|---|---|---|---|---|---|---|
| | Production | Yield | No. trees | Production | Yield | No. trees |
| **Total fructe regional** | **0.38** | **0.43** | **0.01** | **0.11** | **0.16** | **0.17** |
| Plums | 0.42 | 0.45 | 0.01 | 0.12 | 0.20 | 0.25 |
| Apples | 0.50 | 0.54 | 0.05 | 0.23 | 0.21 | 0.08 |
| Pears | 0.45 | 0.45 | 0.05 | 0.23 | 0.16 | 0.11 |
| Peaches | 0.83 | 0.98 | 0.19 | 0.20 | 0.21 | 0.24 |
| Cherries and morello-cherries | 0.41 | 0.41 | 0.05 | 0.10 | 0.14 | 0.06 |
| Apricots and *Prunus armeniaca* | 0.57 | 0.58 | 0.09 | 0.18 | 0.16 | 0.05 |

Source: calculations after the Tempo Online database, NSI

In region West, the production variability decreased during the time passing from a high level to a medium one at majority of species. Although the total apricots production increased, this became more volatile. Anyhow, the apricot represents the only specie at which the yields variability is extremely high and increasing opposed to the previous period (Table 9).

**Table 9.** Variability of production ,yields and trees' number, by total and by species in the Region: West

| Region WEST | Index P1(1996-2005) | | | Index P2 (2006-2015) | | |
|---|---|---|---|---|---|---|
| | Production | Yield | No. trees | Production | Yield | No. trees |
| **Total fruits- regional** | **0.35** | **0.34** | **0.02** | **0.17** | **0.14** | **0.13** |
| Plums | 0.42 | 0.42 | 0.03 | 0.20 | 0.16 | 0.15 |
| Apples | 0.47 | 0.53 | 0.07 | 0.29 | 0.19 | 0.29 |
| Pears | 0.34 | 0.26 | 0.12 | 0.25 | 0.30 | 0.27 |
| Peaches | 0.24 | 0.23 | 0.13 | 0.30 | 0.21 | 0.23 |
| Cherries and morello-cherries | 0.34 | 0.35 | 0.08 | 0.18 | 0.25 | 0.18 |
| Apricots and *Prunus armeniaca* | 0.42 | 0.39 | 0.07 | 0.32 | 0.46 | 0.25 |

Source: calculations after the Tempo Online database, NSI

## CONCLUSIONS

In the first analysed period (1996-2005), the total fruits production had a medium variability level, which was due greatly to the variability degree of the yields. At regional level the fruits production had a medium level of variability in three regions: North-West, North-East and Bucharest -Ilfov; in the other regions the fruits production is characterized by a stressed variability, mainly in South-West Oltenia, region in which also the yields' variability was high.

In the period 2006-2015 it grew the stability degree of the production, mainly due to the variability of yields' reduction. The increase of the stability degree can be explained by the elimination from the production zone of the orchards reaching decline and the partial replacement of the new plantations. During the time, it can be seen a tendency of yields' increase.

At the whole country's level, the best production and yields' stability is registered at the pear trees, and the species with the highest yield variability is the plum tree.

In Region North -West the cherry tree represents the specie with the best stability, during the time, of production and yield.

În Region Center, the pear tree represents the species with the most reduced variability, both for the production and yield, comparatively to the other species, but also within regions.

În Region North-East the best evolution was registered at the apple tree, which passed from a high variability to a reduced one; the production and yield at apples in this region are characterized by the most reduced degree of variability in all the regions.

The Region South -East is to be remarked by the economic performance of orchards, fact explicable through the presence of the corey species, with a high value added. By eliminating from crop the old orchards, the productions' and yields' stability improved, passing from a high variability to one of a medium level for all analysed species.

Although the Region: South Muntenia has a reduced importance as a peaches' producer, in this region the production and the yield at peach are among most stable. Also, both the production and yield at apricot are registering the lowest variability index.

Evolution of Region Bucharest -Ilfov as a fruits producer is a negative one, with important areas; reductions and production losses at all species. It is the only region where there has taken place a significant increase of the variability of yields and production.

South-West Oltenia is the only region in which the plums production has a reduced variability although the yield is not so stable. Comparatively to the other regions, the cherry tree has the lowest variability index both for the production and the yield.

In Region West it was reduced the variability index at majority of species from a high level towards a medium one. Apricot represents the only specie in the region at which the yield variability is extremely high and increasing opposed to previous period.

The reduction of the variability index during the time is confirming the hypothesis that, in case of the fruit trees orchards in our country, the production stability is affected greatly by the structural factors.

## BIBLIOGRAPHY


1. W. J. Burroughs, *Gardening and climate change*, Weather, Volume 57, Issue 5, 2002 P. 151–157
2. Cerutti A. K, Bruunb,S, Gabriele L. Beccaro, Bounousa G, A *review of studies applying environmental impact assessment methods on fruit production systems*, Journal of Environmental Management, Volume 92, Issue 10, October 2011, Pages 2277–2286
3. Coman Mihail, Chiţu Emil coord, *Zonarea speciilor pomicole în funcţie de condiţiile pedoclimaticesi socio-economice ale României*, editura Nivel Multimedia, ISBN 978-973-1886-93-0,