# ABSTRACT

The doctorate thesis is presented on 224 pages, having attached a bibliography that has a number of 289 titles. The properly thesis is structured on two main parts: the first part has on the lenght of 80 pages the present level of knowledge of the analysed domain, the second part on 144 pages, present the personal investigations.

**Key words:** *the forming of stolons, the forming of tubers, photoperiod, foliage index, photosynthetic potential, genotype, etc.*

The theme chosen for study is of great interest if we take into consideration the fact that until today in our country there are few data about the influence of some physiological processes on the precocity and productivity of the potato plants. Enriching the knowledge about the role of some features and biological and physiological indicators in the increase of the efficiency, can redound to the increasing of the chances to create some new genotypes with improved performances.

Through the production capability or production potential we understand the maximum level of practical biomass, that a genotype can realise, benefiting of culture and technology optimum conditions.

The main elements envolved in the reaching of a quantity level of biomass are: the accumulation rithm (daily average accumulation rate) and the durration of this accumulation (active vegetation days).

From the quantitative features that can influence the productivity of the genotypes I took into consideration the following: the structure of the phytomas and the evolution of participation of the parts at the composition

of this in the forming stage and the development of the tubers, the foliage surface and its evolution durring vegetation, the tuber number dynamics and the bushes productivity.

From the „functional" indicators I took into consideration the photosynthesis intensity, the transpiration and the night translocation of the photosynthetic products.

To know with more details the impact of features and indicators impact, on the tubers efficiency, it was considered to be best that these interferences to be seen in more stages of the potato vegetation.

Another objective is the evaluation of the inductions of the „genetic" parts and „the anual conditions" on the indicators and interrelations variability, with the purpose of prominencing those on with amelioration can concur for the increasing of the performances of the new varieties.

Therewith the study submits to prominence the main features of the tested varieties in order to utilize them as genotipes in the future amelioration programs, so for the increasing of the tubers efficiency and also for the improvement of their quality indicators.

In order to realise these objectives there were studied 6 potato genotypes, structured on three precocity groups:

- early (Ostara and Magic);
- midearly (Astral and Rapsodia);
- midlate (Sante and Desiree).

The investigations were made in the amelioration of potato laboratory from the Agricultural Research and Development Station Suceava.

In the presentation of the weather conditions from the investigation period in was considered that the general appreciation of the weather conditions with the help of the differences between a reference value did not

offer precise information rerspecting the favourability of these, because the multiannual average of a temporal sequence does not express in no way the measure in wich the plants requirements are insured, the differences on vegetation phases, concerning a certain weather factor.

The evolution of some weather factors in the investigation years, with separate analysis or in connections, show some distinct elements that influenced, in different degrees, the plants growing processes and the beginning of tubers forming and also their maturation.

Durring the biological cicle, the potato plant goes through some growing phases. The investigations made on the growing evolution of the potato plants, at the biological material was conventional diveded in four main stages:

- vegetative growing;
- the beginning of tubers forming;
- the growing of the tubers;
- maturation.

**Vegetative growing.** Illustrated schematic, the vegetative growing evolves like this: from the eyes burgeons of the tubers there are forming the fangs from witch in optimum conditions of temperaturi an humidity, after planting the roots and stalks are forming. The stalks reach the soil surface – the plant springs – and in the presence of light turns green and begins to form leafes.

The investigations showed the fact that between the analysed varieties do not exist major differentiations about the aspect of the durration planting – springing, no matter the precocity group from withc they are, early, midearly or midlate (five years average beeing 38 – 41 days).

The main stalks are formed from fangs, after the potato comes up. The number of main stalks diversify depending on the variety, but on other factors such as: the size of the tubers, the vigour of the fangs, the conditions in wich the tuber for seed was produces and held, etc.

The results obtained show the fact that between varieties from the same precocity group there were not signifiant differences. The differences semnification in more obvious when we compare the midearly varieties groups and the midlate with the early.

The number of main stalks that come up at the soils surface is lower than the number of fangs from the mother tuber. The determinations made on the studied genetical material show that the transformation percent of the fangs into main stalks was between 66,6% at the variety Ostara and 83,3% at the variety Rapsodia. These data prove that the forming of the propagation elements (eyes, fangs, stalks), is a variety feature, with higher values at the late varieties comparative to the precocious varieties.

It is well known the fact that the leaf realises, in optimum light conditions, the photosynthesis process with the main forming of organic substances (soluble glucides), ensuring the nutrient adn energetic background, necessary for the growing of the aerial part and for the tubers of the plant.

Reaching the maximum foliage surface is different from variety to variety depending on the precocity group. At early varieties, the maximum foliage surface is reached at 50 days after coming up, at midlate varieties at 60 days and at midlate varieties at 60 – 70 days after coming up.

In characterization of the foliage apparatus it was used a synthetic indicator called „foliage index”, that shows the roofing level of the soil with

leafes, respectively the total surface of assimilation reported to the surface unir of the field.

The analysis of the differences purport of the total phytomass (leafes + stalks), calculated comparative to the recorded values from the variety Sante, show that this genotype is net superior to the early group (Ostara and Magic), and in the first part of of the intensive growing of the plants (30 – 50 days of vegetation), recorded superior values (signifiant) than Astral, Rapsodia and Desiree.

Even though the gravimetric report between leafes and stalks offers just a partial information about the bush architecture, the results obtained can suggest that the highe values of this can be associated with a higher degree of self shading. This inconvenient has negative inductions on the foliage apparatus effciency and especialy at the midearly varieties (Astral, Rapsodia) and midlate (Sante, Desiree).

**The forming of stolons and the beginning of tubers forming.** In the dynamics of the stolons number at a plant we see signifiant variations so between the varieties and also, durring the vegetation period, until we reach a constant number of stolons. The early varieties had a smaller number of stolons comparative with the midearly and midlate.

From the investigation made at Suceava resulted that the beginning of the tubers forming took place at almost 25 – 30 days after coming up, when the plants had total foliage surfaces between 30,8 – 36,0 $dm^2$, differenced after the variety and a foliage index of 1,5 – 2,7 $m^2/ m^2$.

Durring the vegetation after the beginning of the tubers forming, the number of tubers was permanently lower than at the variety Ostara (between 6 – 8) and the highest at the varieties Rapsodia and Desiree (9 – 13). At early varieties new tubers do not form any more after 50 days of vegetation while

at the midearly and midlate varieties, the differentiation of new tubers continue for 10 – 20 days.

The investigations made at Suceava respecting the photosynthesis for the studied getical material had as objective the illuminating of the forming particularities of the photosynthesis organs and also the fixing of the night effciency of the assimilationing processes in the plants vegetation dynamics.

The results obtained allow to estimate that the highest variebility of the photosynthetic potential (expressed in mg/dm$^2$ of leaf) was because the stages in wich the determinations were made, in a proportion of 90%. This as a consequence of the fact that after 55 days of vegetation, the photosynthetic efficiency is just 50 – 55% from the one recorded at 35 days and 45 days from the plants coming up. Surprisingly the inductions of the weather conditions from the days in wich the samplings were taken feelt a little - just 1% (relative expresion of the annual variation – 1996 and 1998).

As it is normal (according to the numerous determinations), the dependence for the variation of the differences between varieties was quite moderate – 9,5% from the total variation. The values of the variations coefficient (S%) show that the differences between varieties became more obvious with the vegetation making. This tendency is illustrated of the increasing of the variation with 3 – 4 times (14%), in the stage of 55 days from the coming up of the plants, comparative with that from 35 – 45 days, when the values of "S%" were of 5% and 3%.

**The growing of the tubers.** The production potential of the potato in the result of the aerial assimilation organs capability to give nutrient substances needed for the growing of the tubers after initiation.

From the studied biological components that redound to the increasing of the tubers efficiency can be remarked, the total weight of the green

phytomass, the cumulative foliage index and in a lower measure the foliage surface and the foliage index.

Concerning the variability of the interdependences about the part called “genotype” we can make a few accents:

- no matter the way of exposure of the foliage apparatus, the variety Ostara reacted the least to the modifications recorded. This tendency is because a particular structure of the vegetal carpet, that marked out through the most powerful antagonism between the photosynthetic potential and the tubers efficiency;
- in general the levels of the tubers efficiency correlated more significantly with the features of the vegetal carpet of the midlate varieties and midearly and especially those of the genotype Rapsodia .

The fact that the efficiency (of tubers) variability of a bush was inducted in a proportion of 72% of the annual conditions variations, proves that the productivity of a unit of cumulative foliage surface, was dependent in high measure of other features of the foliage carpet.

The investigation made at Suceava followed the growing dynamics of the tubers, at 10 days intervals, in each of the five years of experimentation, for a characterization of the forming of tubers potential of the varieties from different precocity groups.

The studies realized on the genetic material proved that the variability (the variation) of some indicators, such as the cumulative foliage index, the productive start (the precocious beginning of tubers forming), the net assimilation rate, are because of the genetic particularities (63 – 76%).

The amelioration works can have a bigger efficacy if they have as an objective the improvement of the features of whose genetic variation has higher values from the initial phase of the beginning of the tubers forming.

The tubers particularities of the varieties show a significant precocity at the variety Magic, with a start efficiency (at 30 days of vegetation) of 93 grams/nest.

The experiments made show that the new genotypes (Magic, Astral and Rapsodia) created at the Agricultural Research and Development Station Suceava correspond to the precocity in wich they were situated and because of the good acclimatization at the local weather conditions, they are of great perspective, with valouros productions, through the quantity of tubers and also through the qualitative value of the crop.

# CURRICULUM VITAE

1. **Name:** BODEA
2. **First name:** DUMITRU
3. **Date and place of birth:** 18.05.1962, Negrileşti, județul Vrancea
4. **Address:** Str. Victoriei, nr. 27, bl. E17, sc. A, ap. 9, Suceava
5. **Civil status:** căsătorit, doi copii
6. **Citizenship:** Română
7. **Studies:**
   - 1977 – 1981: Agroindustrial Highschool Râmnicu Sărat, Buzău.
   - 1982 – 1986: Agronomic Institute "Ion Ionescu de la Brad" Iaşi, Agricultural Faculty;
   - 2005: The Agricultural and Veterinary Medicine University"Ion Ionescu de la Brad" Iaşi – postuniversitary studies of specialization "Management and marketing in agriculture";
   - 2004 – 2007: Spiru Haret University, Management Faculty Braşov, specialization Management;

8. **Professional experience:**
   - 1986 – 1990: agronomist engeneer, probationer at Agricultural and Production Cooperative Buimăceni, Botoşani;
   - 1990 – 1995: scientific researcher, in the amelioration of potato laboratory from the Agricultural Research Station Suceava;
   - 1995 – 2007: main researcher III, in the amelioration of potato laboratory from the Agricultural Research and Development Station Suceava;

- 1999 – 2007: director of the Agricultural Research and Development Station Suceava;

**9. Scientific activity:**

- It is materialized through the publication of a number of 15 scientific works presented with the occasion of different scientific manifestations;
- Coordinating of two popularizing works: "The technology of potato cultivation in the conditions from the North of Moldova" and "Potatoe in Bucovina";
- Taking into consideration the fact that the work of an researcher is measured through the number of varieties homologated, I cite that I am the author of 10 potato varieties: *Moldoviţa and Dragomirna (2000), Astral and Magic (2001), Triumf and Rapsodia (2002), Claudiu, Alina and Lord (2003) and Loial (2004);*

**10. Member of the professional associations:**

- Romania spokesman in the European Program of Co-operation in the vegetal genetic resources (ECP/GR) for the group "Potato";
- Member in the Administration Council of the Seed and seed material producers and researchers Association of Romania;
- Member in the Administration Council of the Potato Federation of Romania;
- Member in the "potato" product Council;

- Member in the board of directors in the Potato cultivators Association “Sucidava” from Suceava;

**11. Other aptness:**

- The coordinating of the Amelioration and producing of planting material for the potato program from the Agricultural Research and Development Station Suceava;
- Project director (partner) at two research project in collaboration with The National Research and Development for Potato and sugar beet Braşov and at a project in collaboration to The Research and Development for Potato Station Târgu Secuiesc.