THE INFLUENCE OF FORERUNNER PLANT, THE REGIME OF NUTRITION AND PHENOPHASE AT DYNAMICS OF TOTAL BIOMASS ACCUMULATION IN WINTER WHEAT CULTIVATED ON LUVOSOILS IN THE WESTERN PLAIN OF ROMANIA

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RESEARCH ARTICLE

Abstract

Winter wheat growth is characterized by an increase volume and weight of the whole plant: roots, stem, blades and spike, every component displaying a particular response to the influence of environmental factors, having a particular developmental rhythm function of it's own characteristics.
The knowledge of plants'growth dynamics the intervention in a certain moment or another conducting a de quality the agrotechnical factors (fertilization, sowing period, density, forerunner plant), in order to provide high and stable production.
The dynamics of the phenomena dealing with winter wheat growth made the object of feud researches

Keywords: winter heat, crop rotation, fertilization level, biomass, phenophase, forerunner plant
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INTRODUCTION

Most of the reserches led in Romania, were centrated on the influence of crop rotation on yields, namely on fitomass accumulation and produced an hierarchical ordination of crop rotations with regard to wheat from very beneficial to satisfactory in this order: pea, beans, winter rape, bots, linseed, soja, red clover, potato, sugar beet, sunflower, maize etc.
Domuta and all. (2003) after long run tests demonstrated the importance of forerunner plant on wheat yields on brown-red soils in Romanian Plain. On clay-illuvial podzols, the introduction of ameliorative plants such as red clover represented an element of outmost importance for wheat yield increase.

Bandici, (1997) made some references on the role of forerunner plant on wheat yield, on organic accumulation in whole plant and grains, respectively.

It is demonstrated that after 10-year monoculture, wheat yield decreases continously as compared to crop rotations. It fluctuates as a consequence of changing climatic conditions. Under such circumstances, fertilization does not induce a significant yield increase. A particularly important problem is linked to wheat crop increment, which must fit the rising consumption needs of world population (Guș, Bandici, 2001).

Advances in biomass accumulation dynamics in winter wheat pedo-climatic conditions of Western Plain of Romania were made by Zăhan P. and Zăhan R. (1989) during the studies on Transsylvanian wheat race.

The influence of each of studies factors on dry biomass accumulation in winter wheat shows that crop rotation and fertilization determines essential differences in what concerns the accumulation of dry biomass (Zăhan, Rodica Zăhan, 1989).

Concerning the influence of fertilization on biomass accumulation in winter wheat, frequent researches put in a direct relationship the biomass accumulation and utilized fertilizers.

MATERIAL AND METHODS

A multifactorial experiment (subdivided plats) was set up in the period 2020-2022 at Agricultural Research and Development Station (A.R.D.S.) Oradea, on soils characterised by temporary excess of humidity as luvosoils are having in view the realisation of total biomass as function of phenophase, forerunner plant and regime of nutrition.

The experimental design was polyfactorial in subdivides stands using as factors interaction:. forerunner plant, agrofund and phenophase. As biological material, the Delia race of wheat was employed.

Total phytomass and separately every plants parts were weighted in the laboratory. The results were analysed with ANOVA (analysis of variance), the biomass being expressed as dry weight/10 plants.

RESULTS AND DISCUSSIONS

Figures 1,2,3,4,5 and 6 display graphics that suggest subsequent conclusion:

- a positive correlation exists between the phenophase and total plant biomass accumulation regardless to the forerunner plant.
- the maximal values of total plant biomass accumulation were found in both fertilised and unfertilised alternatives (mineral and organo-mineral fertilisers) corresponding to the formation of spike phase depending also on the quality of the forerunner plant (best alternative-pea).

Concerning the participation of plants'components (roots, stem, blade, spike) it is a function of each component. Thus, in what regards the root, the forerunner plant influenced the weight of participation which reached the highest values in wheat monoculture (at the formation of the spike phase, 20-40 %).

For the rest of the forerunner plants utilised for wheat participation weight was identical with the monoculture, the participation percentage being superior and varying between 23-33 %.

If the regime of nutrition modified the values of the participation weight of the root at the total plant biomass (weight that was higher in the case of the monoculture), the corresponding phenophase was the formation of the spike, being identical with the monoculture.

At the last phenophase, late ripening (complete maturation), the participation weight of the root at the total plant biomass was much lower, varying between 7-9 % low values were obtained in the alternative of wheat cultivation after pea as a forerunner plant (7 %).

Another plant component, the blade participated in a different way at the edification of the plant biomass, even from the beginning: the formation of first internode phase to elongation of the straw phase. In the case of monoculture or corn as a forerunner plant, the blade's participation weight was of 77 % in the first internode phase. After pea, in the straw elongation phase the participation weight was of 67-87 %. This situation corresponds to unfertilised alternatives. After mineral or organo-mineral fertilisation, the participation weight of blades in the same straw elongation phase, oscillated between 76-83 % regardless to the forerunner plant. In the last phase of complete seed maturation, the blades'contribution to total phytomass was lower between 5-7 % regardless to the forerunner plant and regime of nutrition.

The stem participation at total biomass was high, especially in the last phenophase, a positive correlation between the forerunner plant, regime of nutrition and the stem weight being established. (Fig 2)

g.d.w./10 plants

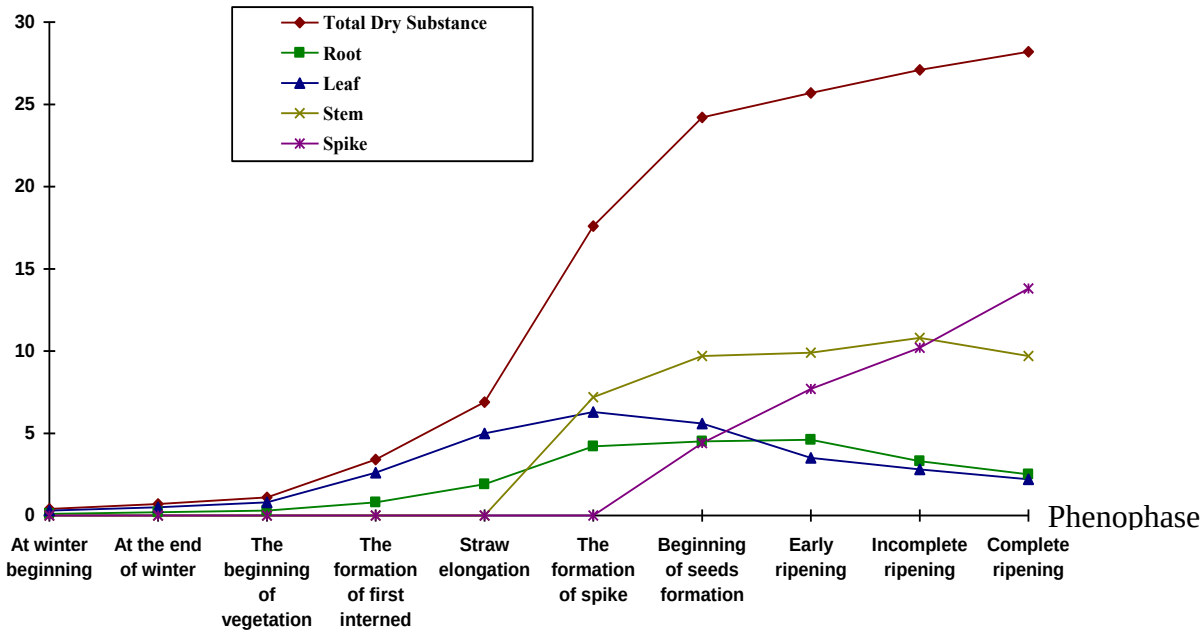

Figure1 **Dynamics of total biomass accumulation in winter wheat monoculture on unfertilised luvosoils (N_0P_0) (Oradea 2020 - 2022)**

g.d.w./10 plants

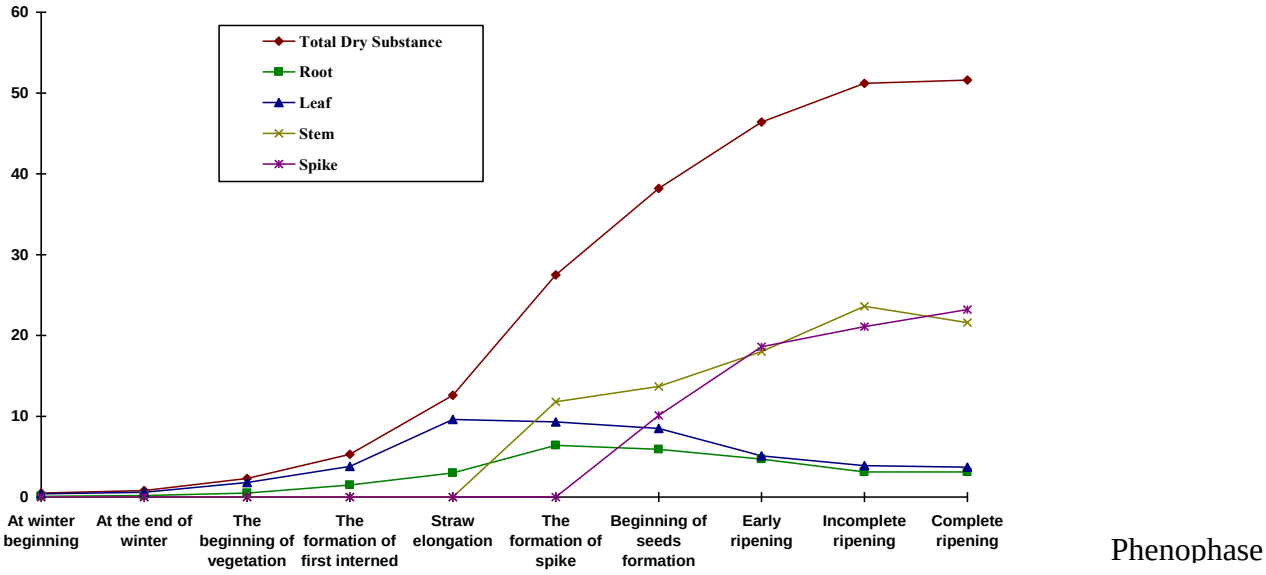

Figure 2. **Dynamics of total biomass accumulation in winter wheat monoculture on luvosoils fertilised with organo-mineral complex ($N_{100}P_{80}$ + 10 t/ha manure) (Oradea 2020-2022)**

g.d.w./10 plants

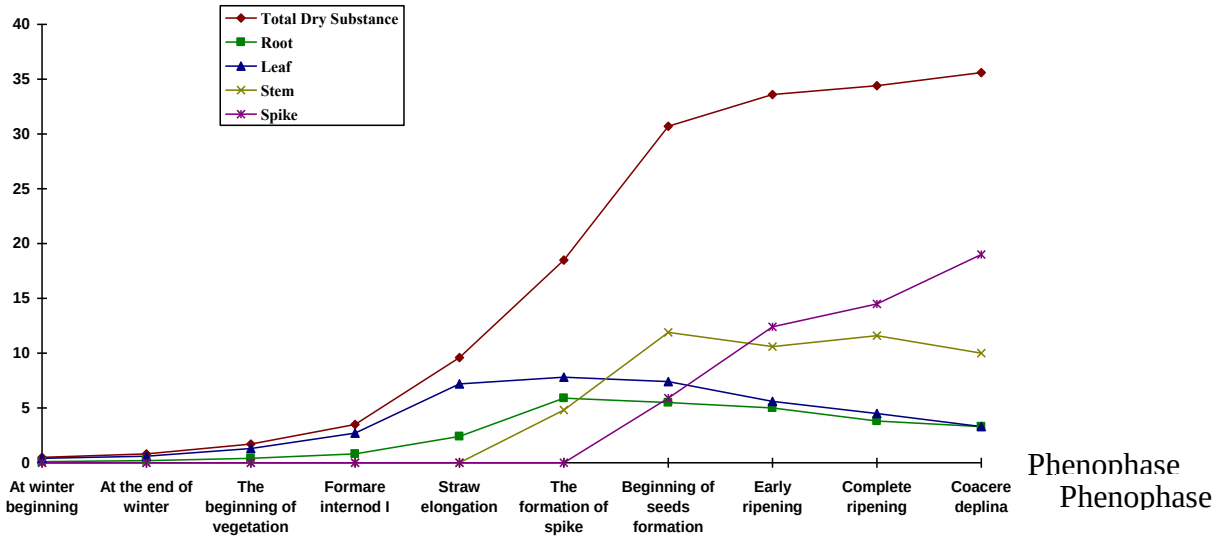

Figure 3. **Dynamics of total biomass accumulation in winter wheat cultivated after maize (M-W) on unfertilised luvosoils (N_0P_0) (Oradea 2020- 2022)**

In the case of wheat monoculture, the stem contribution rose to 34 % in unfertilised alternative. After pea as a forerunner plant, the stem contribution rose to 37 % (crop rotation of 4 years).

As the fertilisation level increased from mineral to complex, organo-mineral fertilisation, the stem weight was high regardless to the forerunner plant but more accentuated in the case of wheat monoculture and after corn (39-42 %). After pea the registrated values varied between 34-39 %, in both cases taking in account the fertilization with mineral fertilizers.

The highest contribution in total biomass realisation was in the case of spike in the last phenophase regardless to the forerunner plant or regime of nutrition when organo-mineral complex was utilised. A comparison with monoculture shows that participation weight of this is of 49 %.

g.d.w./10 plants

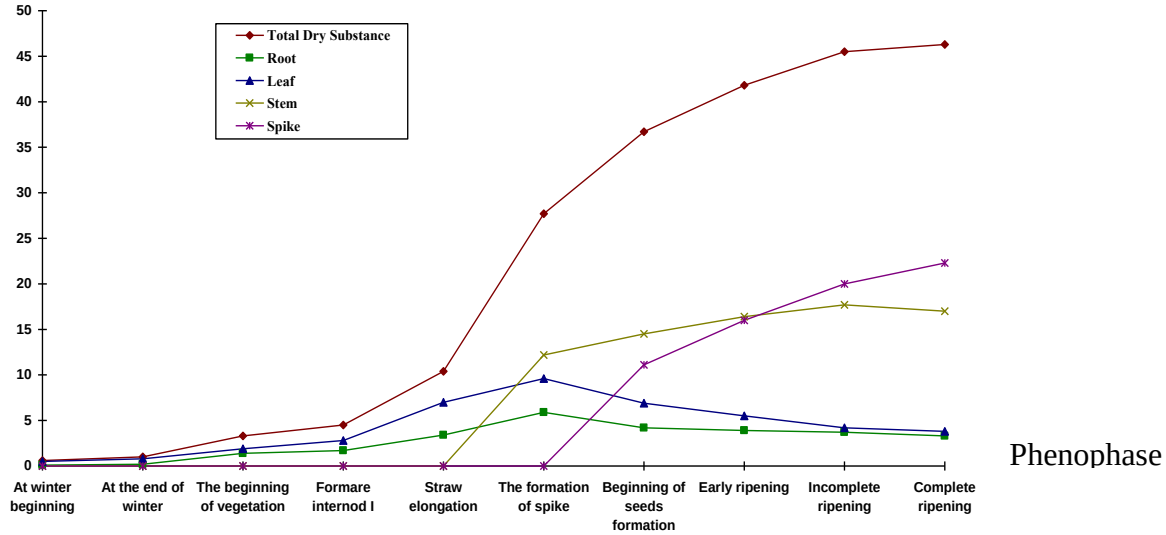

Figure 4. **Dynamics of total biomass accumulation in winter wheat cultivated after maize (M-W) on luvosoils fertilised with organo-mineral complex ($N_{100}P_{80}$ + 10 t/ha manure (Oradea 2020 - 2022)**

g.d.w./10 plants

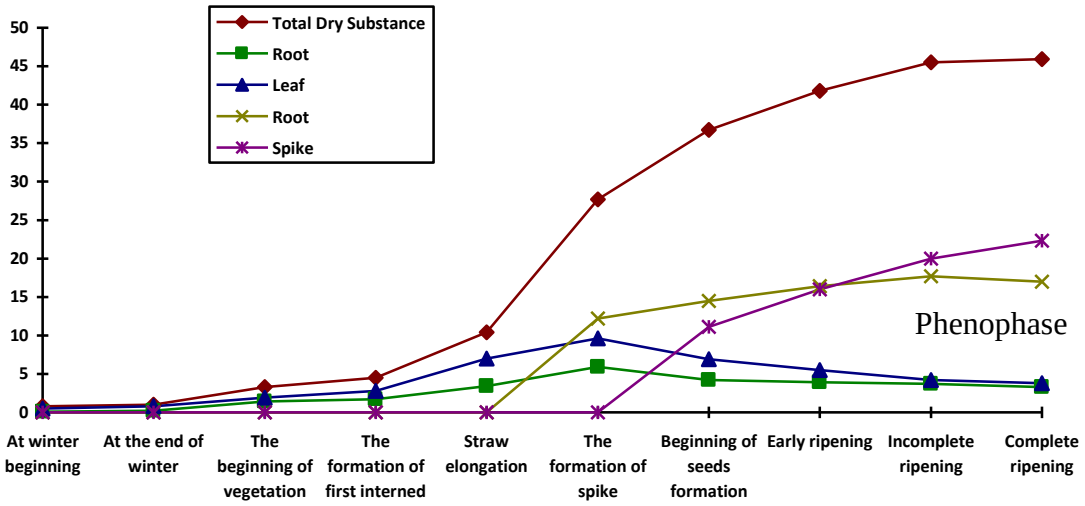

Figure *5.* **Dynamics of total biomass accumulation in winter wheat cultivated after pea (P-W) on unfertilised luvosoils (N_0P_0) (Oradea 2020 - 2022)**

g.d.w./10 plants

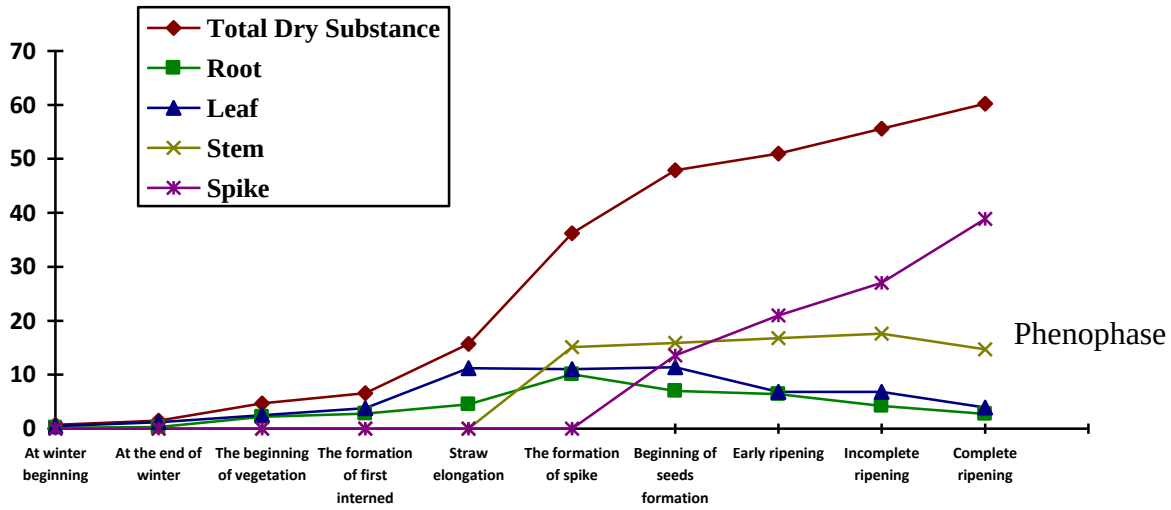

Figure 6. **Dynamics of total biomass accumulation in winter wheat cultivated after pea (P-W) on luvosoils fertilised with organo-mineral complex ($N_{100}P_{80}$ + 10 t/ha manure (Oradea 2020- 2022)**

We consider that the present short presentation of the data illustrates the participation of all plant's components at the realisation of biomass, the most of it belonging to stem and spike.

During the last phenophase, stem contributed substantialls to total biomass accumulation being positively correlated to crop rotation plant and created agrofund.

Stem wheight of total biomass raised proportiionally to agrofund increment due to mineral and organo-mineral fertilization, regardless to crop rotation plant, being more accentuated in the case of wheat monoculture and after maize as crop rotation plant respectiely after pea fertilized with mineral fertilizers.

Main contribution to biomass acumulation had ear during last phenophase,

regardless to forerunner plant and regime of nutrition, forerunner plant and mixed fertilization, as compared to wheat monoculture.

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