TO THE QUESTION ABOUT THE BEHAVIOUR OF SOME RED FESCUE GENERATIONS

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Abstract: The experiment with a polyhybrid population of Red fescue was performed in the period of 1995–2004. It was set annually during the winter from 1994/95, according to the block method with four repetitions. The seeds were collected consecutively in the period after 1992. They were sowed alone and in a mixture from two different, but consecutive years. The oldest seeds were excluded gradually from the scheme and were replaced by others, which had been obtained in the year before the sowing. The behaviors of the generations (dry substance yields, botanical ingredients) are varied. The genotype variance assessment shows that the differences in the productivity are due to a proven genotype influence, i.e. the different generations behave to one another as if they are different species. When the generations from two different sowings are compared, the productivity differences, which are provoked by the genotype influence, are displayed in different years since the grasslands have been used. Considering the productivity, the highest yields were obtained from grasslands created by the combination of seeds gathered in 1993 and 1994, but which were sowed in 1995/1996 and 1996/1997. The investigated generations show a remarkable ability for self–cleaning from weeds. It is found that there are divergences in that tendency. There is a self–sowing of other meadow species which are characteristic for this region. It is assumed that there is a dependence among the formed genetic material and the admission to the environmental factors, durability, the spreading ability. Probably, the particular “structural units” (..., species, population, sort, ...) have a specific “energy configuration”, which is subjected to the Nature rhythm and which represents a peculiar “projection” in Time with a corresponding direction of Evolution.

Key words: Red fescue, generations, rhythm, hypotheses.

Introduction

There is a well–known notion of the ancient people according to which the Earth is exposed to a permanent energy influence with a definite rhythm. Its change determines an adequate reaction in Nature [BAGGOTT, 2000; WONG, 1997, etc.].

There is a possibility to connect the plants' behaviors diversity with the Moon position in relation to the signs of the zodiac [THUN and THUN, 1963; 1996], as there are some discrepancies, too [SPRESS, 1990 A, B]. [THOMPSON, 1989] refers to the interaction between the Earth and the Moon for a longer period of time. Each particular species is subordinated to interdependences different in their character [ALDRICH, 1978; CLEEEVELAND and DUVIC, 1992 etc.].

At the same time there are irreversible rules which led to the creation of some ancient people’s calendars [MADJAROV et al., 2001; MADJAROV et al., 2002; BAGGOTT, 2000; WONG, 1997 etc.].

The most ancient notions of people about cosmogony have found their finished state in Book of Changes (I Ching). Moreover, the structure of the ancient Bulgarians’ calendar has a direct connection with them [VELEV, 2000].

Each year is influenced by a particular constellation and a trigram [BAHSHI IMAN, 1680; a quotation after MADJAROV et al., 2002].

The trigrams reflect fundamental notions in the ancient knowledge about the world [I CHING, 1996].

It should be paid attention to the comparison among a number of ancient
They are based on traditions from thousands of years ago. There are cases of coincidence in the main conclusions between the contemporary investigations [THOMPSON, 1998] and the ancient ones [BAGGOTT, 2000]. In previous publications is introduced the notion of the connection between the Nature energy character and the status of the particular “structural units” (..., species, population, sort ...) [MITEV and BELPERCHINOV, 1996; MITEV and YASHEVA, 1998; MITEV(2), unpublished].

There is an opinion that their behaviors in the environment are defined by the level of energy saturation. Its change leads to shrinking or widening in the area of spreading, i.e., it leads to a shape forming. Besides, there is a mutual interdependence between the reached energy level and the created hereditary information 1, 2, 3, 4 [MITEV and YASHEVA, 1996].

That level (of energy saturation) could be different for grasslands that have been created by some of the Red fescue seed generations. The facts observed here led to the setting of the present experiment on a larger scale than the previous work [MITEV, 2004].

The aim of the research work was to examine the behaviors of a definite number of Red fescue generations and to search for a probable connection with the Nature cyclic recurrence.

Material and methods

The experiment used the block design in 4 randomized replications and a harvest plot size of 1m² [EMECZ, STOKES, 1975].

The previous culture was maize. The soil was light grey, pseudopodzolic forest type with pH 1.2 KCl = 4.0. The exchangeable cations meq/100 g soil are: H⁺ = 0.08; Al³⁺ = 1.30; Mn²⁺ = 0.65; Ca²⁺ = 3.2; Mg²⁺ = 0.4; Ca–Mg = 3.6; humus = 1.39; exchangeable nitrogen = 0.095%

Seeds from Red fescue polyhybrid population were collected annually during the period 1992–2001 in a region with an analogous soil characteristic.

The experiment started with a sowing in the winter of 1994/1995.

Researches [MITEV (1), unpublished] in the region have shown certain advantages of this approach. The grasslands, that have been created, play the role of a weed self–cleaning system.

The weed species, which are characteristic for the grasses, such as Setaria viridis (L.), Setaria glauca (Pal Beauv), Echinochloa crus galli (L.) didn’t have the ability to grow and to progress.

To fight with wide leaf weeds such as Sinapis arvensis (L.), Taraxacum officinale (L.), Lepidium draba (L.) was used an herbicide on the basis 2.4 D in a dose 0.2 kg/da in 3–4 leaves phase of the Red fescue. The experiment was conducted according to the block method.

Each year in the experiment scheme was included seeds from the newest generations and the oldest were excluded. At the same time were mixed seeds from two different but successive years in 1:1 ratio. In this way in the 1st sowing (1994/95) the number of variants is 5. Then it became 7. In the sowings, that are included in the present publications, the variants are as follow:


The sowing was made manually and diffusely with 800 germination seeds per 1 m². It was rolled after the sowing. It was manured annually by P2K2 kg/da during the winter—spring period and by N5 before the beginning of the active vegetation of the plants in the region.

During the research period the grasslands were mowed at the II vegetation in haymaking ripeness. The dry substance yields and the botanical ingredients of the grasslands were accounted in percent. The data include the species that was sown, other self-sowing meadow species (such as *Trifolium repens* (L.), *Trifolium hibridum* (L.), *Festuca arundinacea*. (Shreb.), and weeds. All the activities connected with the creation and growing of the crops were made by one person in order to prevent an eventual change in “the effects of the experiment” [CHAPLIN, 1975].

This is done because of the experiment specificity and its interpretation regardless of the difference in the them of the mentioned author. The average annual temperature (1964—1994) in the region was +9.7°C and in the vegetation period March—October was +13.6°C.

It was lower in 1996 and 1997. And it was higher during the following years. The average annual rainfalls (1964—1994) were 770, 4 mm, and in the vegetation period were 599.7 mm. They were lower in 1996, 1998, 2000. Attention should be paid to 1998 and 2000 when the rainfalls were extremely low in the period of March—October—respectively 266.9 mm and 244.4 mm.

**Results and discussion**

The behavior of the created grasslands is rather contradictory.

In view of the experiment setting and the great quantity of the facts the productivity is depicted by graphics in reference to the results from the grasslands, which were created with the oldest seeds.

In some cases is made a comparison between a particular generation and another one (Figure 1–9). The attention should be focused on the 1st sowing (Figure 1), harvesting in 1998.

The production of grassland, which was created by a mixture of seeds from 1993 and 1994, in comparison with the standard (1992) was with 20.3% (P < 0.001) lower.

In the 2nd sowing (Figure 2) in 1999, the generation from 1995 exceeded that from 1992 (st) with 23.6% (P < 0.01), and
a mixture from 1993 and 1994 exceeded it with 19.4 (P<0.01).
In 2000 the lowering of that combination was with 32, 1% (P<0.001).

In 2001, a mixture of the generations from 1993 and 1994 was 19.7% (P<0.05) more productive than the standard (1992).

**Figure 1.** Relative dry substance yields from 1\(^{st}\) (1994/1995).
**Figure 2.** Relative dry substance yields from 2\(^{nd}\) sowing (1995/1996).
**Figure 3.** Relative dry substance yields from 3\(^{rd}\) sowing (1996/1997).
**Figure 4.** Relative dry substance yields from 4\(^{th}\) sowing (1997/1998).
**Figure 5.** Relative dry substance yields from 5\(^{th}\) sowing (1998/1999).
**Figure 6.** Relative dry substance yields from 6\(^{th}\) sowing (1999/2000).
**Figure 7.** Relative dry substance yields from 7\(^{th}\) sowing (2000/2001).
**Figure 8.** Relative dry substance yields from 8\(^{th}\) sowing (2001/2002).
In the 3rd sowing (Figure 3), in 1999, a mixture of generations from 1994 and 1995 formed a grassland which was 23.8% (P < 0.001) less productive than that with a generation from 1993. (st).

In that sowing (3rd one), a mixture of the generations from 1993 and 1994 showed the highest productivity during the experimental period.

Concerning the yields from 1998, a special attention deserves the grassland created by seeds from 1995 and 1996 and its comparison with the generation from 1994.

The yields were 48.7 % lower (P<0.001). In 2000, a mixture of generations from 1995 and 1996, but the 4th sowing, exceeded the yields from 1994 with 57.0 % (P < 0.001).

There are a great number of similar examples in this experiment. The genotype and ecological variance of the productivity is measured by using a two factor disperse analysis.

The latter is a result of the different growing conditions, when the grasslands from one and the same generations are of one and the same age in the different sowings.

The genotype variance assessment shows that the differences in the productivity are due to a proven genotype influence—Table 1, i.e. the different generations behave to one another as if they are different species.

Table 1.

Proven differences in the productivity between the generations in two consecutive settings.

<table>
<thead>
<tr>
<th>Year of mowing</th>
<th>1st in comparison to 2nd sowing</th>
<th>2nd in comparison to 3rd sowing</th>
<th>3rd in comparison to 4th sowing</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>P = 0.34</td>
<td>P = 0.63</td>
<td>P = 0.73</td>
</tr>
<tr>
<td>II</td>
<td>P = 0.82</td>
<td>P = 0.003**</td>
<td>P = 0.0011**</td>
</tr>
<tr>
<td>III</td>
<td>P = 0.52</td>
<td>P = 0.001***</td>
<td>P = 0.13</td>
</tr>
<tr>
<td>IV</td>
<td>P = 0.001***</td>
<td>P = 0.30</td>
<td>P = 0.32</td>
</tr>
<tr>
<td>V</td>
<td>P = 0.002**</td>
<td>P = 0.04*</td>
<td>P = 0.44</td>
</tr>
<tr>
<td>VI</td>
<td>P = 0.06</td>
<td>P = 0.002**</td>
<td>P = 0.10</td>
</tr>
<tr>
<td>VII</td>
<td>P = 0.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIII</td>
<td>P = 0.04*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When the generations are compared in two consecutive sowings, the productivity differences, which are caused by a genotype influence, are displayed in different years during the grasslands exploitation.

The results from the grasslands' botanical ingredients are shown in average values for the experiment period. In the 1st sowing its 9 years, and in the 9th sowing its 1 year (Figure 10).
Figure 10. Botanical ingredients of the grasslands in the different sowings in average values for the experiment period.

The researched generations belong to *Festuca rubra* L. var. genuina Gr. et Good [MITEV, 1996a,b]. The created grasslands have the ability for self–cleaning from weeds. There are established departures from the shown above. The weed colonization of a grassland, which was created by seeds from 1996, in the 6th sowing reaches up to 17.2%. The weed colonization is relatively high in generation from 1997, 4th sowing.

It's the same with grassland, which was created by a mixture of seeds from 1992 and 1993 in the 2nd sowing–average values of 12.9%. In some years the changes in the generations could be considerable, but they aren't shown in the graphics.

An example for this is grassland created by a mixture of seeds from 1992 and 1993, 1st sowing. From 40% weed colonization in 1998, they were only traces in 1999. During the years of the experiment, the generations (alone or in a mixture) have allowed a self–sowing, in different percent, of other meadow species typical for the region.

In the 1st and 6th sowing the percent of other self–sowed meadow species, in particular years, was considerably greater than the 3rd or 5th sowing and so on. In the 1st sowing, the generation from 1992 formed grassland of the average 17.4% other self–sowed meadow species.

A mixture of seeds from 1993 and 1994 permitted in the grasslands other species of 11.9% average. In 2002, the 1st sowing with the generation from 1992 had 50% other self–sowed meadow species, and the weeds were only 7%.

The analysis of the experiment results leads to the main question–What exactly are we doing when we define a characteristic for some particular meadow sort?

With a great deal of conventionality (considering the shortness of the time span) could be said that the examined generations have formed grasslands which “anticipate” the changes in the environment. The ingredients of the grasslands are significant in this relation. In 1998, mainly the white clover (*Trifolium repens* (L.)) and the hybrid clover (*Trifolium hibridum* (L.)), that had sown by themselves before (especially in 1996 and 1997, 1st and 2nd sowing), “went out” of the associations. Their presence was weak in the next year (1999) in spite of the heavier rainfalls in comparison to 1997. A similar question has been discussed in previous publications. It was found out that the white clover was spread out on a mass scale in the period of 1991–1992 [MITEV(2), in published].

In the present research, the white clover spreading in 1996/97 and in the end of 2002 was on a larger scale, i.e. there has been about 5 years of constant recurrence. The self–spread of the hybrid clover has another succession. The ability of the grasslands to “orientate” according to the environment changes finds expression in the productivity, which
lowered significantly in 2000. The latter year was distinguished by an extraordinary dryness. In that case it couldn’t be accepted that this is the direct factor, which limits the yields. The region is characterized by spring–summer rainfalls maximum. The grasslands were harvested before the coming of the summer–autumn dryness. The autumn tillering, which is a precondition for a next realization, was passed under the conditions of comparatively good humidity in the previous year (1999). In 2001 and 2002 the productivity increased slowly, but it didn’t reach the amounts from 1999 in spite of the heavier rainfalls.

Probably, the findings (for 2001 and 2002) could be explained by the export of nutrients. Then we could rely on the results, which was got from latter sowings (5th; 6th). They have a smaller number of harvesting years, but they don’t differentiate principally from the previous sowings.

Probably they don’t feel nutrients deficit, which possibly exists in the first sowings. Moreover, the problem about the nutrients deficit is less serious concerning the *Red fescue* than it is with other species. It reaches a substance balance when the level of ion saturation is low [BROGOWSKI and TRACZYK, 1978].

The fact is that the productivity in 2002 from the grasslands of 3rd, 4th and 5th sowing is considerably higher than that from 6th and 7th sowings. Also, in 2003 and 2004 the grasslands of 2nd sowing especially, followed by 3rd and 4th sowings were more productive than those of 7th, 8th and 9th sowing. The grasslands of 2nd sowing in 2004 in fact are nine years old.

The influence of factors such as nutrients, light, area and so on over the productivity of the cultures has been discussed in previous publications [MITEV, 1996a; MITEV’ and BELIPECHINOV, 1998; MITEV and YASHEVA, 1998; MITEV(2), unpublished]. The *Red fescue* generations in this experiment behave in a different way in comparison to other authors’ publications from the same region [TOTEV, 1975; 1984 etc.].

According to them the productivity of the artificial grasslands, created on the basis of the *Red fescue*, is higher in the second vegetation and usually it lowers in the third vegetation. Often, the 4th vegetation has degraded on a large scale, which imposes their ploughing.

Bearing in mind other publication of this author, that have been discussed above, the findings in the present one are not a surprise. The comparison of the results and particularly “the contradictions” with the other authors’ opinions [BAGGOTT, 2000; THOMPSON, 1999; WONG, 1997; etc], lead to the thought that the divergence in the plant material behaviour is due to a difference in relation to Time—it is different for each individual variant with all the proceeding consequences.

One of them, probably, is the genetic material transmission. Its direction of synchrony in reference to Time could be “rotary forward, sometimes it is changeable”. It could be liken “pieces of concentrated energy dragging along through the stream of Time”. Some of them” are developing, other decline, and third are capsulated by torn turbulences and remain unchanged”. It is assumed that the formation of endemic species is connected with the energy condition of certain Earth zones.

Each “structural unit” (…species, sort, variant…. ) probably is notable for a specific energy configuration. The act is a result of “sliding and accumulation of past and future in the present moment”. From this point of view Evolution “is happening at that moment” no matter how much prolonged it could be in comparison with other. Nature vibration frequency is connected with the species diversity and the direction of their development.

And if this thing sets a status, a behavior and so on, then in this case all is happening “now”. Likely, each specific “unit” has its peculiar “projection” in Time which determines its ability for “situating in It”. This forms the specificity of the means of expressions. It’s easy to presume the access to environmental factors is variable.

Probably, their specific zones exist, which become a possession of the certain genetic material depending on the presence or lack of synchrony with the Nature rhythm. Its changes could be
submitted to a cyclic recurrence of 12; 60 and so on years.

Depending on the complete turn round of the terrestrial axis in Space it could span a period of 20160 years [VALCHEV, 1988].

Conclusion
The genotype variance assessment shows that the differences in the productivity are due to a proven genotype influence, i.e. the different generations behave to one another as if they are different species. When the generations are compared in two consecutive sowings, the productivity differences, which are caused by a genotype influence, are displayed in different years during the grasslands exploitation.

In relation to the productivity during the research period (1995/2004) the greatest yields are from a grassland which was created by a combination of seeds from 1993 and 1994 in the 2nd sowing (1995/1996) and 3rd sowing (1996/1997).

The distinctions among the productivity of the different generations during the years of seeds producing, sowing, gathering could reach great values. The investigated Red fescue generations show a remarkable ability for self–cleaning from weeds.

During the years of the experiment, the generations (alone or in a mixture) have allowed a self–sowing, in different percent, of other meadow species typical for the region. It is assumed that there is dependence among the formed genetic material and the admission to the environmental factors, durability and the spreading ability.

Probably, the particular “structural units” (..., species, population, sort, ....) have a specific “energy configuration”, which is subjected to the Nature rhythm and which represents a peculiar “projection” in Time with a corresponding direction of Evolution.

Notes
1. It is considered that the power of energy informational fields exceeds those of the genetic code [LAZAREV, 1998].

2. The information, in a broader sense, at first is turned into a substance and then produces energy. The energy transforms into a substance which strives to accumulate energy and information. All that is in the frames of a natural cyclic succession [LAZAREV, 1997].

3. The information, respectively in a little different aspect, as an enigma it’s not a material, it’s not an energy, but it’s a bearer of matter and energy. On a larger scale it is a quantum–self–bearer of matter and energy [MATEEV, 2001].

4. The analysis of footnotes 1–3 leads to the question What a genetic information is? Isn’t it a part of the whole? If it’s so, then is it necessary to define the archetype and the power of the discussed concepts? As a symbol of reality they represent a mutual conditionality [MATEEV and YASHEVA, 1998].

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