DOI: 10.21005/AAPZ2016.37.1.03

FOLIA POMERANAE UNIVERSITATIS TECHNOLOGIAE STETINENSIS
Folia Pomer. Univ. Technol. Stetin., Agric., Aliment., Pisc., Zootech. 2016, 325(37)1, 19–28

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THE EFFECT OF DIFFERENT DOSES OF FERTILISATION WITH PHOSPHORUS, POTASSIUM AND NITROGEN ON SEED YIELD OF *DACTYLIS GLOMERATA* L. OF 'TUKAN' VARIETY

WPŁYW ZRÓŻNICOWANYCH DAWEK NAWOŻENIA FOSFOREM, POTASEM I AZOTEM NA PLON NASION *DACTYLIS GLOMERATA* L. ODMIANY 'TUKAN'

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Streszczenie. Badania przeprowadzono w Rolniczej Stacji Doświadczalnej Lipki w Lipniku k. Stargardu na glebie brunatnej kwaśnej, wytworzonej z piasku zwałowego lekkiego naglinowego (5 Bw pgl : pgm), która charakteryzowała się w poziomie Ap małą zawartością próchnicy (1,57–1,59%) i części spławialnych (11,9–12,4%). Doświadczenie polowe założono w układzie split-plot, w czterech replikacjach o powierzchni poletka wynoszącej 12 m^2. W badaniach uwzględniono dwa czynniki: I – dawki fosforu i potasu (P + K kg · ha^{-1}): 60 + 120 i 90 + 180 oraz II – dawki azotu (N kg · ha^{-1}): 0, 40, 80 i 120. Doświadczenie założono w 2010 roku; wysiano nasiona *Dactylis glomerata* odmiany 'Tukan' (8 kg · ha^{-1}) w jęczmień jary, zbierany na ziarno. Badania obejmowały dwa lata zbioru nasion (2011 i 2012). W badaniach określano: obsadę roślin w latach pełnego użytkowania, liczbę pędów generatywnych na roślinie, długość kwiatostanów, liczbę kłosków i nasion w kwiatostanie oraz plony nasion i słomy. Obserwacje biometryczne wykonywano na 25 losowo wybranych kwiatostanach z każdego poletka. Plon nasion i słomy określano z powierzchni każdego poletka w trakcie zbioru nasion. *Dactylis glomerata* odmiany 'Tukan' charakteryzowała się większym plonem w pierwszym niż w drugim roku zbioru nasion. Uzyskane wyniki wskazują, że zakładając plantację na glebie lekkiej z siewu współrzędnego w jęczmień jary, zasadne było stosowanie 120 kg N, 60 kg P i 120 kg K · ha^{-1}. Zwiększone nawożenie fosforowo-potasowe (90 kg P i 180 kg K · ha^{-1}) nie różnicowało badanych cech morfologicznych roślin (liczby pędów generatywnych na roślinie, długości kwiatostanu, liczby kłosków i nasion w kwiatostanie), natomiast zastosowane nawożenie azotem, w dawkach 40, 80 i 120 kg · ha^{-1} wpływało korzystnie na zwiększenie wymienionych cech.

Key words: morphological features of plants, *Dactylis glomerata* L., 'Tukan' variety, light soil, seed and straw yield.
Słowa kluczowe: cechy morfologiczne roślin, *Dactylis glomerata* L., odmiana 'Tukan', gleba lekka, plony nasion i słomy.

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INTRODUCTION

The varieties of *Dactylis glomerata* available on the market are characterised by great diversity in terms of utility type, yielding and nutritional value (Łyszczarz and Dembek 2003). In our economic conditions, the new variety of pasture grass should be characterised not only by high biomass yields and good fodder quality, but also by high (cost-effective) seed yield (Lutyńska 1994; Domański 1997). According to Martyniak (1994), new grass varieties of high economic value, but with a slightly lower seed yield, do not encourage producers to reproduce them and therefore they are not very accessible in seed trade. In their paper, Martyniak and Domański (1983) indicate that habitat conditions and agricultural techniques affect seed yield to a similar extent as genetic variety features of a particular species and grass variety.

The aim of the study was to determine the effect of different doses of phosphorus, potassium and nitrogen fertiliser on seed yield and selected biometric features of *Dactylis glomerata* L. of 'Tukan' variety, grown on light (acid brown) soil.

MATERIAL AND METHODS

The study was performed at the Lipki Agricultural Experimental Station in Lipnik near Stargard, on acid brown soil formed of light glacial sand on clay (5 Bw pgl : pgm), which was characterised by low content of humus on Ap level (1.57–1.59%) and clay particles (11.9–12.4%). The level of groundwater was below 3 metres. The soil was qualified to the Polish valuation class IVb of good rye complex (5) which is included into agronomic category of light soils. The field experiment was set up in split-plot system in four replications, with an area of a single plot of 12 m^2. The study included two factors: I – doses of phosphorus and potassium (P + K $kg \cdot ha^{-1}$): 60 + 120 and 90 + 180, II – doses of nitrogen (N $kg \cdot ha^{-1}$): 0, 40, 80 and 120. The experiment was established in 2010 by sowing *Dactylis glomerata* seeds of Tukan variety in spring barley harvested for grain. Sowing was conducted on 14th April 2010 by the use of row seed drill, with row spacing of 22.5 cm, in the amount of 8 $kg \cdot ha^{-1}$ perpendicularly to the seeds of nurse crop. Weed control was conducted in spring, in the second decade of April, with the use of herbicide mixture – Chwastox Extra (1 $l \cdot ha^{-1}$) + Starane (0,6 $l \cdot ha^{-1}$). The collection of *Dactylis glomerata* seeds was conducted on 15th July 2011 and on 10th July 2012 with the use of plot combine-harvester when seeds started to fall. After drying the seeds were purified of contaminants with Haldrup cleaner. The overground mass of *Dactylis glomerata* was mowed in the first decade of October (this paper does not include the results of this research). Fertilisation with phosphorus and potassium was conducted in autumn in the doses established in methodology. At the same time 20 kg $N \cdot ha^{-1}$ (in the form of ammonium nitrate) was used. The second dose of nitrogen, which was a supplement to the variants of the second factor, was used in spring before plant vegetation in the years of seed collection.

Detailed studies include: plant density in the years of full use, number of generative shoots per plant, inflorescence length, number of spikelets and seeds per inflorescence as well as seed and straw yield. Biometric observations were conducted in 25 randomly selected inflorescences of each plot. Seed and straw yield was determined on the area of each plot during seed collection. The results showing the formation of morphological features of plants and seed and straw yield were statistically analysed with the use of classic analysis of variance and and the significant difference of the results was determined with the use of Tukey's test with p = 0.05. Tables 2–6 show the results of significant differences only for the studied factors, however interaction between the studied factors was not included due to the fact that it was irrelevant.

The pattern of meteorological conditions in individual years of the study was varied (Table 1). In the first year of the experiment (2010) abundant precipitation was recorded especially in may (91.6 mm) – which contributed to the growth of nurse plants (spring barley) and undersown crops as well as stubble of *Dactylis glomerata* in August (184.4 mm). In the first year of full use (2011) total rainfall in the growing season was 381.5 mm and it was much lower than in 2010 but higher than the amount characteristic for multiannual period. In 2011, the distinctive months were July and April, when the amount of rainfall was the highest (148.5 mm) and the lowest (12.5 mm) respectively. In the second year of full use, the rainfall in the growing season (April–October) was 371.5 mm. During the growing season and vegetative biomass growth (April–June) the rainfall was smaller than the average of multiannual period, however in the period of generative development (July), it significantly exceeded the average of multiannual period. Average monthly temperatures in the years of the study were higher than characteristic values for multiannual period.

Table 1. Monthly air temperature means and monthly sum of rainfalls on the background of multiyear 1961–2000 average (Lipki)
Tabela 1. Średnie miesięczne wartości temperatury powietrza i miesięczne sumy opadów atmosferycznych w latach 2010–2012 w odniesieniu do wielolecia 1961–2000 (Lipki)

Year Rok	Month – Miesiąc												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	IV–X
	Temperature – Temperatura [°C]												
Multiyear mean Średnia z wielolecia	–1.1	–0.3	2.8	7.4	12.7	16,0	17.6	17.2	13.3	8.8	3.8	0.4	13.3
2010	–5.5	–0.6	3.8	8.7	11.1	17.0	22.2	18.5	13.2	7.5	4.7	–4.7	14.0
2011	0.7	–0.9	3.9	11.9	14.3	18.2	17.7	18.3	14.9	9.5	4.1	3.9	15.0
2012	1.7	–2.3	6.3	8.8	15.5	16.2	18.6	18.1	14.5	8.7	5.1	–0.7	14.3
	Showers – Opady [mm]												
Multiyear mean Średnia z wielolecia	35.0	26.0	34.0	38.0	52.0	62.0	67.0	54.0	47.0	39.0	41.0	41.0	359.0
2010	36.1	21.2	43.8	16.8	91.6	10.6	86.7	184.4	56.3	34.7	100.3	72.6	481.1
2011	31.0	33.4	23.9	12.5	27.9	44.8	148.5	57.7	52.2	37.9	1.0	70.8	381.5
2012	64.7	41.1	18.0	32.4	21.1	45.8	103.4	90.2	25.1	53.5	40.5	39.1	371.5

RESULTS AND DISCUSSION

The results indicate a positive response from *Dactylis glomerata* of 'Tukan' variety to the applied doses of phosphorus-potassium and nitrogen fertilisers. Assessing the response of plants to the combinations of fertiliser indicated by development of plant density in the years of full use, it should be noted that a higher dose of P + K (90 + 180) contributed to an increase in plant density by 7.7% in 2011 and by 7.9% in 2012, while the differences were statistically insignificant (Table 2). The use of nitrogen fertilising in the doses of: 40, 80 and

120 kg · ha^{-1} contributed to a significant increase in plant density by 15.7%, 20.0% and 27.1% respectively in 2011 and by 14.7%, 20.2% and 27.0% in 2012, compared to plant density of *Dactylis glomerata* on the object not fertilised with nitrogen.

Table 2. Plant stock density in the years of utilization [pcs. · m^{-2}]
Tabela 2. Obsada roślin w latach użytkowania [szt. · m^{-2}]

Dose nitrogen – Dawka nawozu [kg · ha^{-1}]		Year – Lata		Mean
P + K	N	2011	2012	Średnia
60 + 120	0	33.0	31.8	32.4
	40	39.0	37.8	38.4
	80	41.0	40.0	40.5
	120	43.0	42.0	42.5
Mean – Średnia		39.0	37.9	38.4
90 + 180	0	37.0	36.5	36.8
	40	42.0	40.5	41.3
	80	43.0	42.0	42.5
	120	46.0	44.5	45.3
Mean – Średnia		42.0	40.9	41.4
Mean of nitrogen fertilisation Średnia dla nawożenia azotem	0	35.0	34.1	34.6
	40	40.5	39.1	39.8
	80	42.0	41.0	41.5
	120	44.5	43.3	43.9
$NIR_{0,05}$ – $LSD_{0,05}$				
P + K		n.i.	n.i.	n.i.
N		2.4	2.9	2.7

n.i. – difference insignificant – różnica nieistotna.

Analysing the development of generative shoots on plants it should be noted that on objects where higher dose of PK was used plant density was greater per area unit, however the plants produced less generative shoots (Table 3).

Table 3. Generative shoots number per plant
Tabela 3. Liczba pędów generatywnych na jednej roślinie

Dose of fertilization – Dawka nawozu [kg · ha^{-1}]		Year – Lata		Mean Średnia
P + K	N	2011	2012	
60 + 120	0	13.3	12.0	12.6
	40	14.1	13.3	13.7
	80	14.5	14.3	14.4
	120	21.5	19.0	20.2
Mean – Średnia		15.8	14.6	15.2
90 + 180	0	12.2	11.5	11.9
	40	13.3	13.5	13.4
	80	14.5	13.8	14.1
	120	15.8	15.0	15.4
Mean – Średnia		14.0	13.4	13.7
Mean of fertilization nitrogen Średnia dla nawożenia azotem	0	12.7	11.8	12.2
	40	13.7	13.4	13.6
	80	14.5	14.0	14.2
	120	18.6	17.0	17.8
$NIR_{0,05}$ – $LSD_{0,05}$				
P + K		1.6	n.i.	n.i.
N		3.7	2.5	2.9

Explanations see Table 2 – Objaśnienia zob. tab. 2.

On average, on the object with doses of 60 kg P and 120 kg K · ha^{-1} there were15.2 generative shoots per plant, and on the object with a higher dose of phosphorus and potassium (60 kg P and 120 kg K · ha^{-1}) – 13.7 generative shoots. This response was recorded in both years of the study. Plants showed positive response to the dose of nitrogen fertilising (40, 80 and 120 kg · ha^{-1}), where growth of generative shoots was 11.5, 16.4 and 46.0% respectively, in comparison to the number of generative shoots per plant where nitrogen fertilising was not applied. In the first year of the study (2011) the increases were 7.9, 14.2 and 46.5% respectively, and in the second year (2012) they were 13.6, 18.6 i 44.1% respectively. It should be noted that the plants produced more generative shoots in the first year of seed collection than in the second year. Falkowski et al. (1996) state that the relationship between producing generative shoots and yielding of seed grass plantations is complex and requires constant verification. As argued by Hill and Watkin (1975) the shoots of higher potential to yield seeds are generative shoots that have been previously developed, as they have longer inflorescences and a larger number of spikelets. A positive correlation between the developed generative shoots and a number of spikelets per inflorescence on seed yield was recorded by Niemeläinen (1989) and Borawska-Jarmułowicz (2011). In the studied variety of *Dactylis glomerata* the length of inflorescences in 2011 ranged from 9.2 cm to 13.4 cm depending on the level of nitrogen fertilisation, and from 9.9 cm to 14.0 cm in the second year (2012) of seed collection (Table 4). On average in the years of the study, increasing doses of nitrogen by another 40 kg · ha^{-1} to 120 kg N · ha^{-1} caused, in comparison to the object without nitrogen fertilisation, an increase in the lengths by 8.8, 25.2 and 29.1% respectively. An increased dose of phosphorus and potassium had no significant effect on the length of inflorescence in the first year of seed collection, however a growing tendency appeared.

Table 4. Length of inflorescence
Tabela 4. Długość kwiatostanów [cm]

Dose of fertilization – Dawka nawozu [kg · ha^{-1}]		Year – Lata		Mean Średnia
P + K	N	2011	2012	
60 + 120	0	10.7	9.2	9.9
	40	11.4	10.4	10.9
	80	13.2	11.9	12.6
	120	13.4	12.4	12.9
Mean – Średnia		12.2	10.9	11.6
90 + 180	0	11.0	9.9	10.4
	40	11.5	11.1	11.3
	80	13.5	12.3	12.9
	120	14.0	12.9	13.4
Mean – Średnia		12.5	11.5	12.0
Mean of fertilization nitrogen Średnia dla nawożenia azotem	0	10.8	9.5	10.2
	40	11.5	10.7	11.1
	80	13.4	12.1	12.7
	120	13.7	12.6	13.1
$NIR_{0,05}$ – $LSD_{0,05}$				
P + K		n.i.	0.3	0.3
N		1.4	1.2	1.6

Explanations see Table 2 – Objaśnienia zob. tab. 2.

Positive response of plants to mineral fertilisation was found in a number of spikelets per inflorescence (Table 5). On objects with higher dose of PK, spikelets per inflorescence were more numerous, which was confirmed by statistical analysis. Such regularity occurred in both years of the study. When a higher dose of nitrogen was used, plants responded with a larger number of spikelets per inflorescence, however a significant difference was noted only after applying 80 kg N · ha^{-1} in the second year of the study (2012), and 120 kg N · ha^{-1} in the first year of the study (2011).

Table 5. Spikelet number in inflorescence
Tabela 5. Liczba kłosków w kwiatostanie

Dose of fertilization – Dawka nawozu [kg · ha^{-1}]		Year – Lata		Mean Średnia
P + K	N	2011	2012	
60 + 120	0	17.3	16.3	16.8
	40	17.8	16.8	17.3
	80	18.5	17.5	18.0
	120	19.5	18.5	19.0
Mean – Średnia		18.3	17.3	17.8
90 + 180	0	17.8	16.8	17.3
	40	18.3	17.3	17.8
	80	19.5	18.0	18.8
	120	20.8	19.8	20.3
Mean – Średnia		19.1	17.9	18.5
Mean of fertilization nitrogen Średnia dla nawożenia azotem	0	17.5	16.5	17.0
	40	18.0	17.0	17.5
	80	19.0	17.8	18.4
	120	20.1	19.1	19.6
$NIR_{0,05}$ – $LSD_{0,05}$				
P + K		0.4	0.4	0.3
N		2.6	2.4	2.5

Explanations see Table 2 – Objaśnienia zob. tab. 2.

Similarly to the number of spikelets, the number of seeds per inflorescence depended to a greater extent on the level of nitrogen fertilisation rather than phosphorus and potassium fertilisation (Table 6).

Table 6. Number of seeds in inflorescence
Tabela 6. Liczba nasion w kwiatostanie

Dose of fertilization – Dawka nawozu [kg · ha^{-1}]		Year – Lata		Mean Średnia
P + K	N	2011	2012	
60 + 120	0	75.8	77.5	76.6
	40	87.8	85.0	86.4
	80	93.3	89.8	91.5
	120	110.8	97.0	103.9
Mean – Średnia		91.9	87.3	89.6
90 + 180	0	81.5	81.5	81.5
	40	100.8	86.8	93.8
	80	110.0	92.5	101.3
	120	116.3	100.8	108.5
Mean – Średnia		102.1	90.4	96.3
Mean of fertilization nitrogen Średnia dla nawożenia azotem	0	78.6	79.5	79.1
	40	94.3	85.9	90.1
	80	101.6	91.1	96.4
	120	113.5	98.9	106.2
$NIR_{0,05}$ – $LSD_{0,05}$				
P+K		2.7	n.i.	2.4
N		7.3	6.5	5.7

Explanations see Table 2 – Objaśnienia zob. tab. 2.

The beneficial effect of higher phosphorus and potassium dose was statistically confirmed in 2011. There was no significant interaction between doses of phosphorus-potassium and nitrogen fertilising. The results indicate, that the number of seeds per inflorescence increased with increasing the doses of nitrogen. On the object fertilised with nitrogen at 40 kg · ha^{-1} an increase was 13.9% and increasing nitrogen doses by 80 and 120 kg N · ha^{-1} caused an increase by 21.9% and 34.3% in comparison to the object without nitrogen fertilisation. The observed differences were statistically significant and concerned the two years of the study. Falkowski et al. (1996) also recorded the beneficial effect of NPK fertilisation on the development of generative shoots and the morphological structure of inflorescences. Hampton et al. (1983) emphasise the particular role of fertilisation in the development of generative shoots. Falkowski et al. (1988) in their study on *Dactylis glomerata* pointed out that the delay in spring fertilisation with nitrogen up to the phase of spikelets growth caused a decrease of flowers per spikelet and seeds per inflorescence. According to Wojcieska (1994) nitrogen fertilisation stimulates plant propagation, which increases the assimilation surface and consequently affect the development of seed yield. When doing research on *Dactylis glomerata*, Olszewska (2006) found a beneficial effect of nitrogen on the intensity of photosynthesis and on other physiological processes, SPAD index value, and consequently on an increase of plant biomass.

The results presented in Table 7 indicate that 'Tukan' variety of *Dactylis glomerata* was characterised by higher yielding potential in the first year than in the second year of seed collection.

Table 7. Seed yield
Tabela 7. Plon nasion [dt · ha^{-1}]

Dose of fertilization – Dawka nawozu [kg · ha^{-1}]		Year – Lata		Mean Średnia
P + K	N	2011	2012	
60 + 120	0	5.50	4.22	4.86
	40	7.08	4.53	5.81
	80	7.86	4.94	6.40
	120	9.06	5.06	7.06
Mean – Średnia		7.38	4.69	6.03
90 + 180	0	6.03	4.19	5.11
	40	7.56	5.31	6.43
	80	8.61	5.53	7.07
	120	9.22	6.67	7.94
Mean – Średnia		7.86	5.42	6.64
Mean of fertilization nitrogen Średnia dla nawożenia azotem	0	5.76	4.21	5.00
	40	7.32	4.92	6.12
	80	8.24	5.24	6.74
	120	9.14	5.86	7.50
$NIR_{0,05}$ – $LSD_{0,05}$				
P + K		n.i.	n.i.	n.i.
N		0.57	0.76	0.56
P + K x N		n.i.	1.39	n.i.
N x P + K		n.i.	1.,07	n.i.

Explanations see Table 2 – Objaśnienia zob. tab. 2.

Martyniak and Domański (1983) state that most of grass species produce higher seed yield in the first year of harvest. The study of Borawska-Jarmułowicz (2011) on *Dactylis glomerata* varieties show that the highest seed yield is obtained in the second and the third year of harvest, and the smallest in the fourth. In the first year of our study, we obtained, depending on the combination, the yield from 5.50 to 9.22 dt · ha^{-1} and in the second year of harvest from 4.19 to 6.67dt · ha^{-1}. The pattern of results illustrating the response of 'Tukan' variety to mineral fertilisation on light soil, indicates that increasing the doses of phosphorus and potassium fertilisation to 90 kg P and 180 kg K · ha^{-1} did not contribute to a significant increase in seed yield. Significant increases in yield were recorded on objects fertilised with varied doses of nitrogen. In the first year – 2011, seed yield increased with increasing nitrogen doses, while no significant interaction between fertilising with phosphorus-potassium and nitrogen was found. In the second year of seed collection (2012) there was an interaction indicating that at lower level of phosphorus-potassium fertilising (60 kg P + 120 kg K · ha^{-1}), increases of seed yield were within the error limits, while at higher dose PK (90 kg P + 180 kg K · ha^{-1}) the yield increased with increasing doses of nitrogen, and a significant difference was recorded after applying 120 kg N · ha^{-1}. The mean results of two years indicate a beneficial effect of used nitrogen doses on both levels of phosphorus-potassium fertilising (Table 7). When conducting research with *Festulolium braunii* on ligh soil, Czyż and Kitczak (2009) found also a positive effect of nitrogen fertilising used in a dose of 120 kg N · ha^{-1} in comparison to phosphorus-potassium fertilising applied in a dose of 60 kg P + 120 kg K · ha^{-1}. When fertilising plants with nitrogen in autumn and spring, Falkowski et al. (1988) obtained 860 kg of *Dactylis glomerata* seeds, while when fertilising only in spring – 560 kg · ha^{-1}.

Assessing the effect of the used fertiliser combinations on the straw yield, it should be noted that there was no significant response of 'Tukan' variety to the doses of phosphorus-potassium fertilising, while the effect of used nitrogen doses was beneficial in both years of the study (Table 8). On average, the obtained straw constituted 51.2% in 2011 and 54% in 2012 of the yield in relation to the seed yield. On an object without nitrogen fertilising, the participation of straw yield was on average 48.0% and with nitrogen dose of 120 kg · ha^{-1} it was 56.5%. The values indicate high stability of relation between the yield of seed and straw.

Table 8. Straw yield
Tabela 8. Plon słomy [dt · ha^{-1}]

Dose of fertilization – Dawka nawozu [kg · ha^{-1}]		Year – Lata		Mean Średnia
P + K	N	2011	2012	
60 + 120	0	2.22	2.03	2.13
	40	3.94	2.19	3.07
	80	4.39	2.64	3.51
	120	4.56	3.69	4.13
Mean – Średnia		3.78	2.64	3.21
90 + 180	0	3.17	2.19	2.68
	40	3.89	2.36	3.13
	80	4.19	2.89	3.54
	120	4.83	3.86	4.35
Mean – Średnia		4.02	2.83	3.42
Mean of fertilization nitrogen Średnia dla nawożenia azotem	0	2.69	2.11	2.40
	40	3.92	2.28	3.10
	80	4.29	2.76	3.53
	120	4.69	3.78	4.24
$NIR_{0,05}$ – $LSD_{0,05}$				
P + K		n.i.	n.i.	n.i.
N		0.55	0.27	0.37
P + K x N		n.i.	n.i.	n.i.
N x P + K		n.i.	n.i.	n.i.

Explanations see Table 2 – Objaśnienia zob. tab. 2.

CONCLUSIONS

1. Increasing the level of phosphorus-potassium fertilising (from 60 kg P and 120 kg K to 90 kg P and 180 kg K · ha^{-1}) had no significant effect on the development of plant density, number of generative shoots, lenght of inflorescence, number of spikelets and seeds per inflorescence, while the used doses of nitrogen of 120 kg N · ha^{-1} had a beneficial effect on the above mentioned features of *Dactylis glomerata* plants of 'Tukan' variety.
2. Analysing the effect of the studied factors on seed yield of *Dactylis glomerata* of 'Tukan' variety, it should be noted that increasing the level of phosphorus and potassium fertilising up to 90 kg P and 180 kg K · ha^{-1} increased the yield in the years of the study on average by 10.1%, while using doses of nitrogen (40, 80 and 120 kg · ha^{-1}) increased the yield by 22.7, 35.1 i 50.4% respectively, in comparison to seed yield obtained from the object fertilised only with phoshporus and potassium.
3. The results illustrating the development of seed and straw yield of *Dactylis glomerata* of 'Tukan' variety indicate that on light soil higher yield is obtained in the first year than in the second year of cultivation.

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Abstract. The study was conducted at the Lipki Agricultural Experiment Station in Lipnik near Stargard Szczeciński on acid brown soil formed of light glacial sand on clay (5 Bw pgl : pgm), which is characterised by low content of humus on Ap level (1.57–1.59%) and clay particles (11.9–12.4%). The field experiment was set up in split-plot system in four replications, with an area of a single plot of 12 m^2. The study included two factors: I – doses of phosphorus and potassium (P + K kg · ha^{-1}): 60 + 120 and 90 + 180, II – doses of nitrogen (N kg · ha^{-1}): 0, 40, 80 and 120. The experiment was established in 2010 by sowing *Dactylis glomerata* seeds of 'Tukan' variety (8 kg · ha^{-1}) in spring barley harvested for grain. The study included two years of seed collection (2011 and 2012). The study determined plant density in the years of full use, number of generative shoots per plant, inflorescence length, number of spikelets and seeds per inflorescence as well as seed and straw yield. Biometric observations were conducted in 25 randomly selected inflorescences from each plot. Seed and straw yield was determined on the area of each plot during seed harvest. *Dactylis glomerata* of 'Tukan' variety was characterised by higher level of yields in the first than in the second year of seed collection. The obtained results indicate, that when establishing a plantation on light soil with companion planting in spring barley, it is advisable to use 120 kg N, 60 kg P and 120 kg K · ha^{-1}. The increased phosphorus-potassium fertilisation (90 kg P and 180 kg · ha^{-1}) did not change the studied morphological features of plants (number of generative shoots per plant, length of inflorescence, number of spikelets and seeds per inflorescence), while fertilising with nitrogen in doses of 40, 80 and 120 kg · ha^{-1} had a positive effect on increasing the above mentioned features.