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MORPHOLOGICAL AND PHENOLOGICAL INVESTIGATION OF GAZANIA SPLENDENS L. WITH THE VIEW OF ITS ORNAMENTAL QUALITY

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Key words:

Gazania splendens
biometrical investigations
ampleness
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Abstract

Gazania splendens L. is annual plant from Asteraceae. The origin is South Africa, where it can be found as a wild plant. In our country it is introduced during the last 10 years. The aim of the current study is to establish the morphological and phenological requirements of *G. splendens* with the view of its ornamental quality. The study is carried out in the experimental field of the IPGR – Sadovo during 2010-2012. A biometrical measurement of 12 accessions has been made. From each accession are measured 20 plants. Phenological observations, ampleness and productivity are observed. As a result of the study the can be made the conclusions that *Gazania splendens* demonstrates stable morphological characters, and thus it is very suitable for ornamental purposes. There is simultaneity in the development of plants, almost simultaneously germination and flowering, as well as relatively long flowering and growing season. Ampleness and productivity of flowering in annual flowers are one of the most important indices that define their ornamental value. These indices show stable and steadily increasing during the vegetation period.

Introduction

Gazania splendens L. is an annual plant belonging to the botanical family *Asteraceae*. Originates from South Africa where it is found in the wild in many large areas. In our country it is introduced during the last 10-15 years.

Gazania plants are low, with small leaves and long flowering period, which makes them very suitable for ornamental purposes (formation of color groups). (Varbanova, K., et al. 2001)

Successful exploitation of *Gazania* in landscaping of parks and gardens is due to the decorative qualities that plants have. Collection and processing of collections is an important prerequisite for the use of plant genetic resources for breeding or directly in practice (Kristeva L. St. Nejkov 1998). One of the main directions of breeding work in ornamental species is to create varieties with pure color, but also those with mixed hues of blossoms as is in *Gazania* (Dryagina I. D. Kudryavets 1986.). Assessment of ornamental plants, unlike other cultures include quantitative evidence, considered in terms of the decorative effect you create, rather than the higher values (Boylov B.

1978). Lower plants and the location of the leaves makes *Gazania* preferred for planting in borders (Hohlova K. Dimitrieva T. 1983).

The purpose of this study is to establish eco-biological requirements of *Gazania splendens* to use for ornamental purposes.

Material and methods

Studies were conducted on the experimental field of IPGR-Sadovo, during 2010 - 2012. The seeds are sown in the middle of April to prepare seedlings. At the end of May the plants are transplanted in the field at a distance 30/60sm. Biometrical measurement of 12 accessions has been made. From each accession are measured 20 plants (Roessler, H. 1959).

The following biometrical parameters were reported: plant - height, width and number of flowering stalks, flowering stalks- length and diameter, leaf blade - length, width, diameter of inflorescence, flower - length and diameter. The inter-phase periods are sowing - germination, sprouting - flowering and growing period are reported. The ampleness flowering and yield of three different dates during the 15 days of

the 10 pre-tagged plants of each sample are tracked. The variation in performance was recorded by the scale Peev, 2001.

Results and Discussion

G. splendens is a low plant, reaching about 30 cm in height. The leaves are long, linear, sometimes cutted at the root, gathered in a basal rosette. The flowering stalk comes out of the base and there no leaves on it. Inflorescence is a basket with a row Tonguefishes colors. The diameter of the inflorescence is 3-8 cm coloration is different - yellow, pink, cream, brown and others. In most varieties to the main color of the blossoms have additional colors which gives a high ornamental value of the colors (Fig. 1). In gloomy weather blossoms closed and collected together, and in sunny open again. The seeds are very downy, when ripe fall around the rosette or gone with the wind.

In the Institute of Plant Genetic Resources - Sadovo are created and maintained collection of 20 varieties of *Gazania*. The average results for each year from the three-year biometric measurements are given in Table 1.

The data indicate that variability (CV%) of the indicators is not significant over the years. Variation in the height of the plant is very low, in the range 3.12

8.89%. Greater variation was observed in the width of the plant, starting from a very low (9.96%) and reaches moderate (33.49%). The number of nodes is a strong variation in the first year (32.84%), while in the second and third it is negligible (respectively 1.29% and 2.94%).



Fig.1. Color variation of *G. splendens*

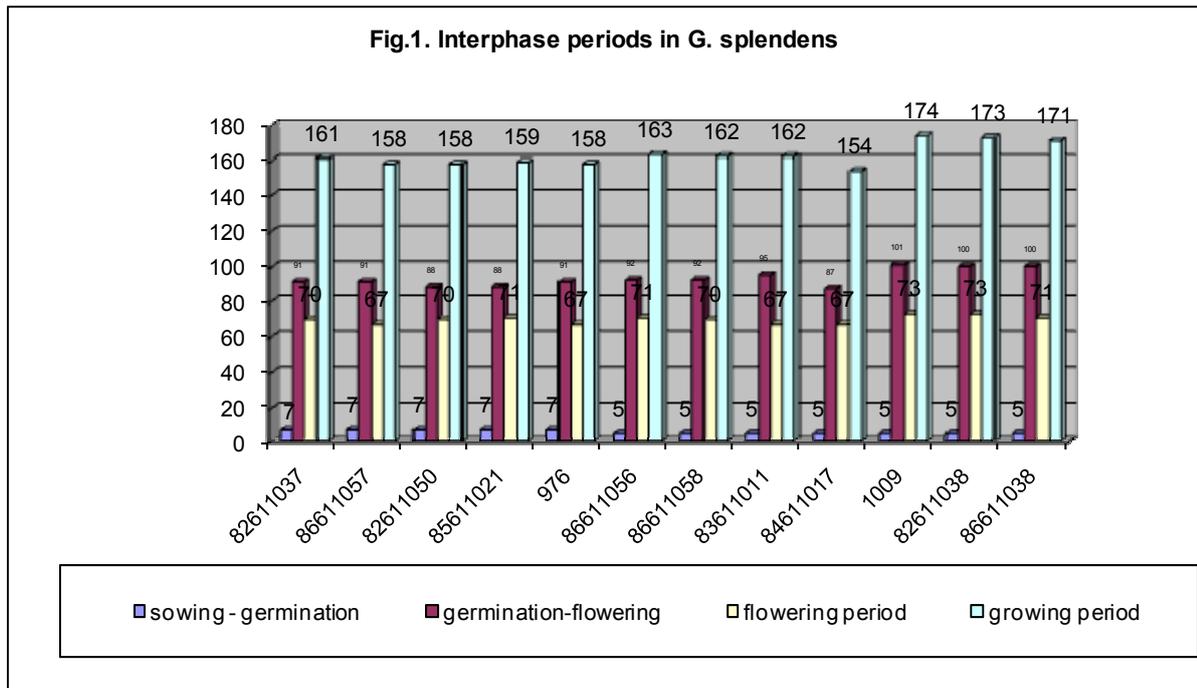
Table 1. Biometrical measurements of *G. splendens* L.– 2010-2012 /average for each year/

	Plant			Flowering stalk		Leaf		Inflorescence diameter	Tonguefishes blossoms		Tubols		Calyx	
	height	width	number of flowering stalks	length (cm)	diameter	length			number	length	length	diameter	length	diameter
2010														
x±Sx	29.93±0.86	45.7±1.67	16.98±1.65	19.08±0.74	0.84±0.1	9.9±0.58	4.66±0.18	6.9±0.18	18.59±0.48	2.96±0.1	1.01±0.03	1.65±0.04	1.78±0.05	1.35±0.04
min	17.3	33.7	11.7	16.1	0.55	7.85	3.94	6.15	16.3	2.52	0.86	1.42	1.4	1.1
max	27.6	54.9	32	24.4	1.87	15.1	5.89	8.11	22.2	3.46	1.24	1.84	1.98	1.68
CV %	8.89	33.49	32.84	0.74	0.13	3.99	0.37	0.4	2.78	0.11	0.01	0.01	0.03	0.02
2011														
x±Sx	26.65±0.71	45.51±1.14	15.98±0.5	28.63±0.77	1.46±0.86	9.82±0.37	5.16±0.17	6.77±0.11	18.88±0.44	3.1±0.04	1.05±0.02	1.42±0.04	1.99±0.04	1.45±0.04
min	22.8	38.4	12.1	24.2	0.44	8.4	4.03	6.14	15.9	2.86	0.93	1.24	1.6	1.22
max	30.35	53.1	18.3	34.5	10.89	13.11	5.98	7.3	20.9	3.42	1.22	1.74	2.19	1.69
CV %	6.01	15.61	2.94	7.12	8.83	1.66	0.36	0.13	2.27	0.02	0.01	0.02	0.02	0.02
2012														
x±Sx	30.41±0.51	24.39±0.91	11.39±0.6	28.28±0.51	0.8±0.05	15.56±0.32	3.57±0.26	6.75±0.13	17.31±0.37	3.77±0.37	1.08±0.12	1.52±0.05	2.03±0.07	1.15±0.03
min	27.53	19.25	7	29.95	0.54	13.95	2.17	6.17	15.8	1.98	0.99	1.3	1.5	1
max	33.7	28.7	13.9	31.85	1.17	17.8	4.88	7.65	19.6	4.72	1.72	1.87	2.31	1.35
CV %	3.12	9.96	1.29	3.12	0.04	1.24	0.82	0.21	1.66	1.6	0.17	0.03	0.06	0.01

The length and diameter of flowering stalks have little variation over time (from 0.74 to 7.12% in length and 0.04 to 8.83% in diameter). The same pattern is observed in other indicators. Because of the morphological measurements, we conclude that

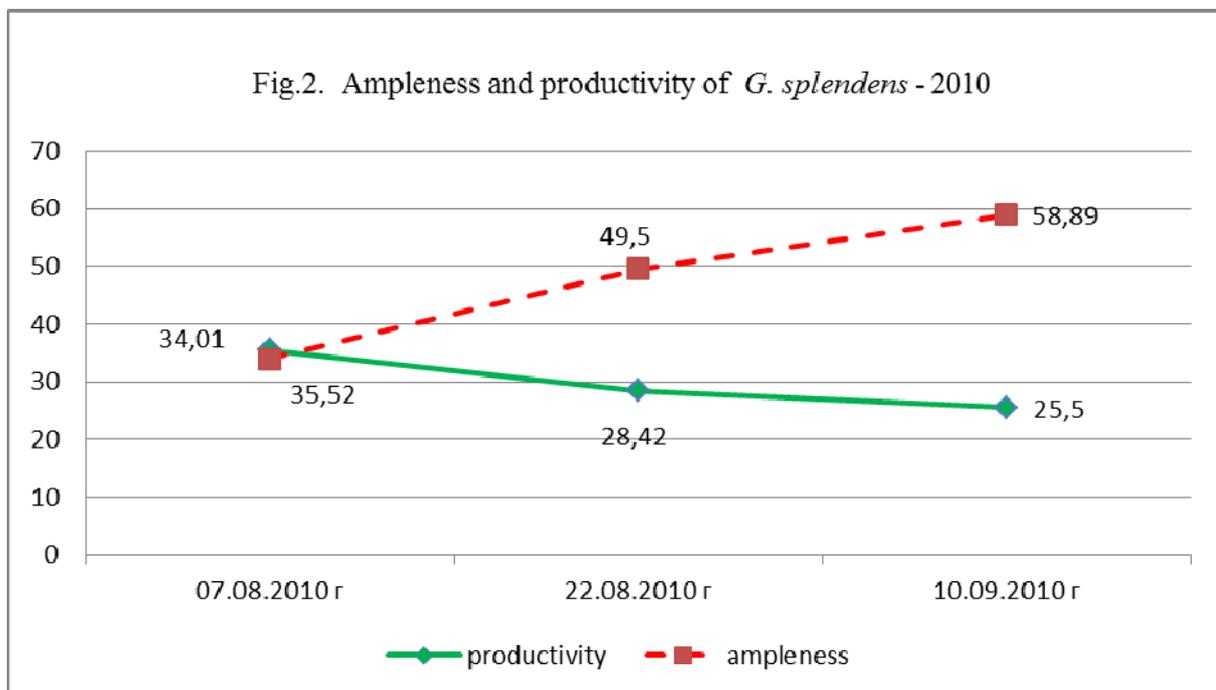
Gazania is morphologically stable over the time, which makes it very suitable for ornamental purposes.

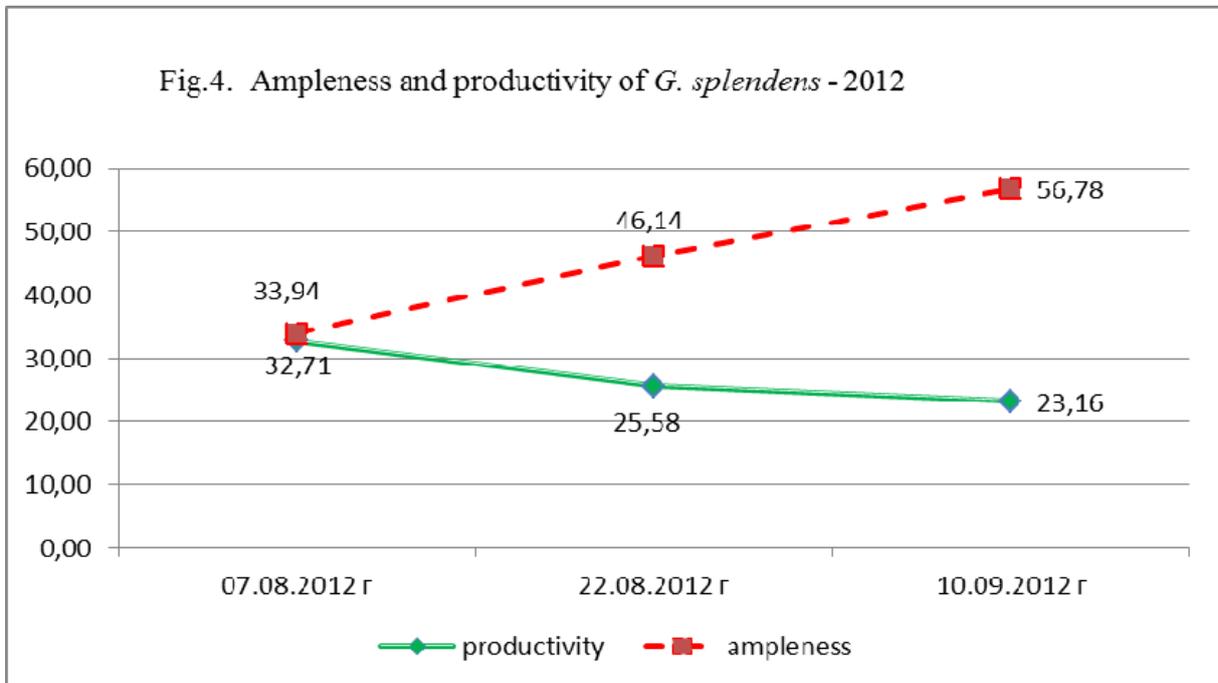
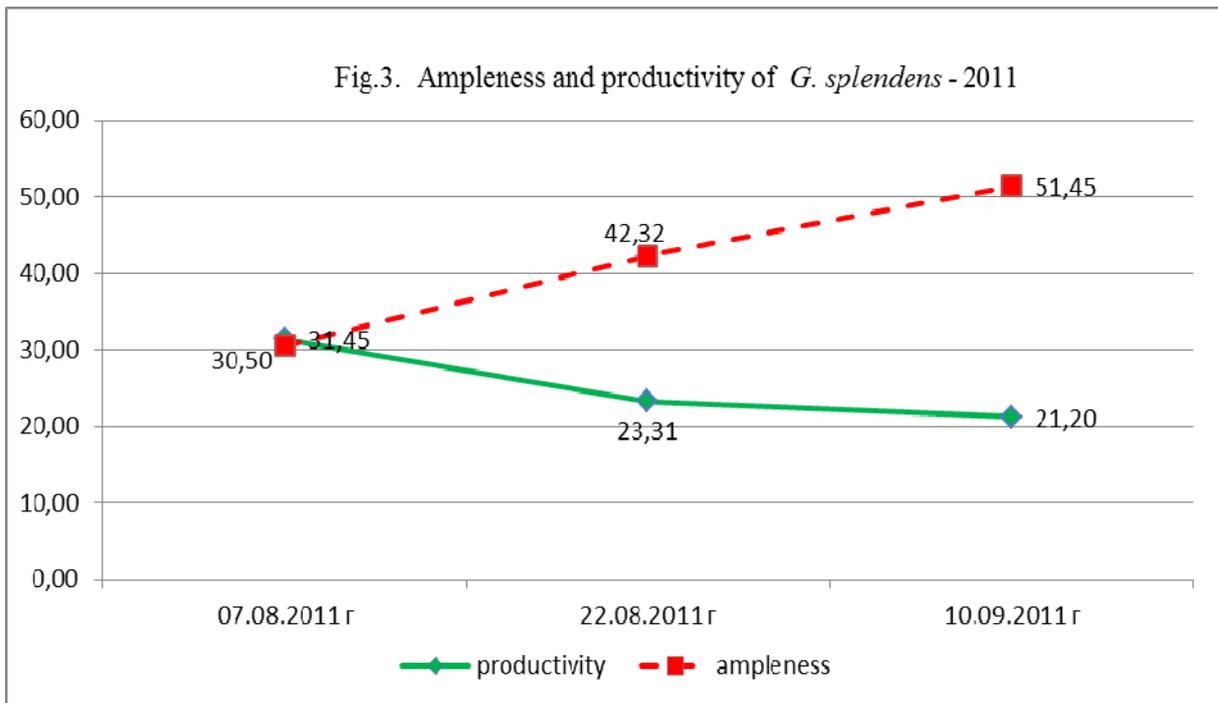
The interphase periods - sowing - germination, sprouting - flowering and vegetative and flowering periods and are shown in Figure 1 (number of days on average for three years).



The figure shows that for all samples sowing germination period is 5 to 7 days (mean 5.8 days), germination - flowering - from 87 to 101 days (mean 93 days), flowering period is from 67 to 73 days (mean 69.75 days) and the vegetation period is from 154 to 174 days (mean 162.75 days). These data indicate simultaneity in the development of plants, almost

simultaneous emergence and flowering and flowering and relatively long growing season. Ampleness and productivity of flowering in annual flowers are one of the most important indices that define their ornamental value. In *G. splendens* ampleness and productivity were recorded in the 15 day period each ear. The results are shown in Figures 2, 3 and 4.





Ampleness and productivity were recorded on three dates (07.08.2012, 22.08.2012 and 10.09.2012). The charts show that on the first date ampleness and productivity are almost identical each year. Yearly comparison shows that there are minor differences. On the second and third date productivity gradually declined, which is valid for the three years of study. The largest decline was in 2011 (21.20 inflorescences), and the lowest - in 2010 (25.5 inflorescences). The degree of variation (CV%) between the minimum and maximum value, however, is extremely low to low (according to scale, Peev, 2001), (Table 2) and therefore can be considered as insignificant.

Ampleness is an indicator which takes into account the total number of inflorescences of a plant that are formed during the vegetation. The charts, (Fig.2,3,4), show that ampleness grows significantly and the last date of reporting the number of inflorescences per plant has almost doubled compared to the first reporting date and that tendency is valid for the three years of investigation. The degree of variation between the minimum and maximum value for that indices is also very small (Table 2) and therefore can be considered as insignificant.

Table.2. Average productivity and ampleness of *G. splendens*

	productivity			ampleness		
	07.08	22.08	10.09	07.08	22.08	10.09
$\bar{x} \pm S_x$	33.23 \pm 1.2	25.77 \pm 1.5	23.29 \pm 1.25	32.81 \pm 1.16	45.99 \pm 2.07	55.7 \pm 2.21
min	31.45	23.31	21.2	30.5	42.32	51.45
max	35.52	28.42	25.5	34.1	49.5	58.89
CV%	4.34	6.55	4.63	4.03	12.9	14.69

Conclusions

As a result of the biometric measurements and phenological observations of specimens from the collection of IPGR - Sadovo can make the following conclusions.

1. *Gazania splendens* appears to be morphologically stable over time, which makes it very suitable for ornamental purposes.
2. There is simultaneity in the development of plants, almost simultaneous emergence and flowering and flowering and relatively long growing season.
3. Ampleness of flowering increased significantly and steadily during the growing season and the highest values were recorded in the first ten days of September.

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