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Резюме

При відсутності чіткої дивергенції сортозразків люцерни за ознаками насіннєвої продуктивності селекційне їх покращення повинно базуватися на використанні внутрішньопопуляційної мінливості. Насіннєва продуктивність в значній мірі залежить від досягнутого рівня селекційного покращення, головним чином, двох основних складових — "число бобів в китиці" і "число насінин в бобі".

При отсутствии строгой дивергенции сортообразцов люцерны по признакам семенной продуктивности селекционное их улучшение должно базироваться на использовании внутрипопуляционной изменчивости. Семенная продуктивность в значительной степени зависит от достигнутого уровня селекционного улучшения, главным образом двух составляющх — "количество бобов в соцветии" и "количество семян в бобе".

At absence strict divergention Grade a sample of Lucerne to attributes of seed efficiency their selection improvement should be based on use Inside population of variability. The seed efficiency substantially depends on the achieved level of selection improvement mainly two compound — "quantity of beans in flovers" and "quantity seeds in a bean".

RÁCZ F., HIDVÉGI S., SZPKE C., HADI G., PÁL M., MARTON C.L

Agricultural Research Institute of the Hungarian Academy of Sciences,
P.O.B. 19. Martonvásár, 2462 Hungary, email: raczfe@mail.mgki.hu

POLLEN PRODUCTION OF INBRED MAIZE LINES IN DIFFERENT YEARS

The majority of maize varieties and hybrids are able to produce adequate quantity of viable pollen under various ecological circumstances, and pollen production cannot be considered as a limiting factor as far as yield is concerned (Duvick, 1997, Westgate *et al.*, 2003). However, extreme abiotic stress factors may cause flowering asynchronism, reducing the chance of fertilization or may generate the production of less viable pollens in lower quantity.

Plants are the most susceptible to decreased water supply right before and during the process of flowering. Water deprivation often results in the disorder of pollen production or even the complete lack of it (Hall *et al.* 1980, Herrero and Johnson, 1980), or may delay the development of style. The response of genotypes depends on the extent of stress, and the inherited traits of the genotype under stress. Inbred lines are especially vulnerable to stress factors, which is manifested in pollen production and the viability of pollen grains as well.

Due to the negative correlation between pollen production and grain yield, the number of new inbred lines with tassels of insufficient size, characteristics and unsatisfactory pollen production has increased, risking safe seed production. Plant breeders often select for small tassel size to reduce the dominance of tassels over cobs (Fisher *et al*. 1987). Westgate and Basetti (1991) found that inadequate pollen production caused by small tassel size reduced yield during top cross seed production. According to Ulibelarrea *et al.* (2002) little information is available on the pollen production of modern hybrids, while tassels are significantly smaller than in the past.

Methods

Between 2002 and 2005, the pollen production of 19 inbred lines and 2 sister line crosses of Martonvásár were examined in three repetitions in split-split-plot arrangement in Martonvásár. Data were analysed using multifactorial analysis of variance in accordance with the instructions of Sváb (1967).

The soil of the field of experiment is clayey with residual forest soil. The size of plots was 3.8 m^{-1}. Artificial fertilizer containing nitrogen, phosphorus and potassium in the rate of 1:1:1 was spread on the field in the quantity of 300 kg/ha. Chemical weed control was carried out before and after emergence, and mechanical weed control was also applied.

The average temperature in June 2002 was 1.3 °C higher than the 30 years' average, and the amount of precipitation also exceeded the average of many years by 23 mm. The number of hot days (19) was high as well. The distribution of precipitation was uneven as most of the rainfall occurred during the second decade of the month.

The year 2003 was extremely droughty in Hungary, however, this deficiency in precipitation did not occur during flowering in July, but in August. The average monthly temperature in July was only 0.2 °C higher that the 30 years' average. The amount of precipitation exceeded the average by 15.4 mm. The number of hot days was 12, therefore, this year was unfavourable in terms of flowering. The distribution of precipitation was beneficial this year.

In July 2004 precipitation was 7.8 mm less than the 30 years' average, while the average monthly temperature was 1 °C lower than that. In July 2005 precipitation exceeded the 30 years' average by 23 mm, while the average monthly temperature was 0.7 °C lower than that. The distribution of rainfall was more favourable in July 2005. In 2004 there were 12 extremely hot days, while in 2005 there were 9 of it. Altogether, the wet weather of July 2005 with its average hot temperatures can be considered as more advantageous concerning the flowering of maize.

Pollen was collected in pollen bags in each plot from 5 plants of the same flowering stage. The collecting of pollen was started on the day when the first anthers appeared on the tassels' main branches. Measurements were carried out until there was no measurable quantity of pollen in the bags any more. Pollen was cleaned of impurities (anthers, insects, etc.) using fine-meshed screen.

Results and discussion

Our aim was to determine the pollen producing ability of the inbred lines examined and the effect of the year of production as an environmental factor on pollen production. The total pollen production of inbred lines as well as the duration of pollen production were analysed.

Genotype had significant effect on pollen production on an average of both experimental years (Fig. 1). The total average pollen production of the experiment is 0,651 g/plant. Line_1 proved to be the most productive with its pollen production of 1,58 g/plant, while HMV5408 gave the smallest amount of pollen (0,21 g/plant) during the flowering period.

The year of production also had a significant effect on pollen production. Considering the average of the genotypes examined, pollen production was highest in the year 2004 (0.8 g/plant), and lowest in 2002 (0.51 g/plant) (Fig. 2).

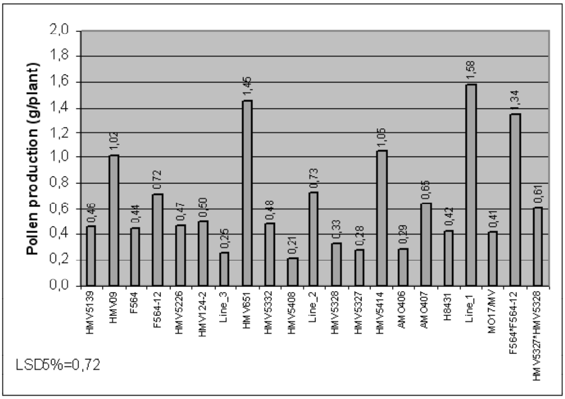

Figure 1: **Pollen production of inbred lines**

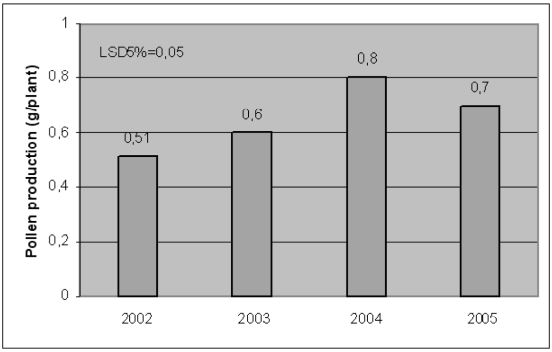

Figure 2: **The effect of the year of production on the pollen production of inbred lines**

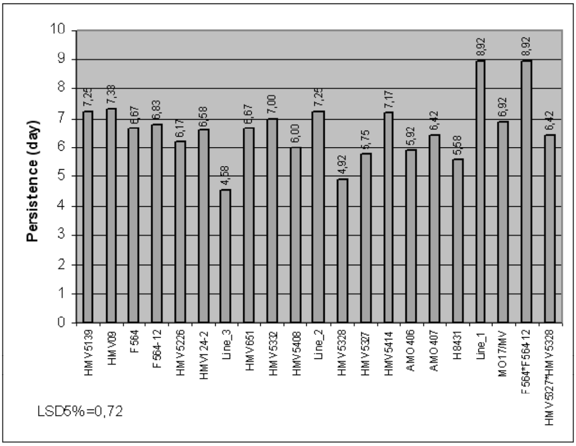

Figure 3: **Persistence of inbred lines**

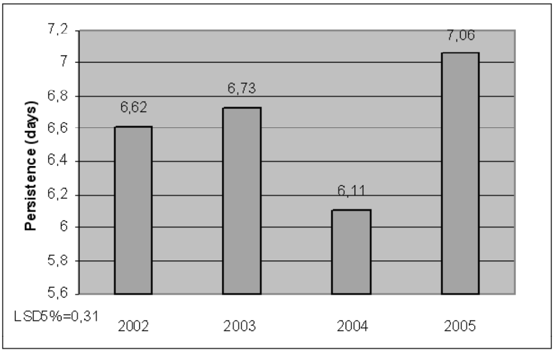

Figure 4: **The effect of the year of persistence of inbred lines**

Concerning persistence, significant difference was found among inbred lines on an average of the two years examined (Fig. 3). The average duration of measurable pollen shed was 6.631 days. Line_1 and F564*F564-12 were found to shed pollen for the longest time (8.92 days), while line_7 tasselled for the shortest period (4.58 days).

The year of production had significant effect on persistence as well. In 2005 pollen shed lasted 0.43 days longer on average and 0.95 days longer than in 2004 (Fig. 4). Although the differences are considerable from the aspects of agronomy, they are statistically significant.

The values are influenced not only by the absolute values of temperature and precipitation but their distribution in time as well.

Conclusions

The results of our four-year experiment show that the pollen production of the inbred lines examined was significantly influenced by both genotype and the year of production.

Similarly to the amount of pollen produced, genotype and the year of production had significant effect on persistence as well.

Wet and average hot July with more uniform distribution of precipitation promotes pollen production and the duration of pollen shed.

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АВАКЯН Э.Р., КУМЕЙКО Т.Б., ОЛЬХОВАЯ К.К.
Всероссийский научно-исследовательский институт риса
Россия, 350921, Краснодар, п./о Белозерное, arrri_kub@mail.ru

ОЦЕНКА УСТОЙЧИВОСТИ ИСХОДНОГО МАТЕРИАЛА РИСА К ПИРИКУЛЯРИОЗУ ПО СОДЕРЖАНИЮ КРЕМНЕЗЕМА

Одним из важнейших направлений в селекции риса является выведение сортов устойчивых к пирикуляриозу. Гриб Piricularia Oryzae Cavara поражает посевы риса, и потери урожая при этом могут превышать 30%. Обладая мощным ферментативным аппаратом, гриб воздействует на клетку, что приводит к нарушению целостности растительного организма, проявляющемуся не только в механическом повреждении, но и в расстройстве физиолого-биохимического метаболизма, конечным результатом которого может быть гибель растения. Растение риса — саморегулирующаяся система, способная во многих случаях справляться с неблагоприятными внешними воздействиями, если они не носят запредельный характер.

Важным показателем устойчивости риса к пирикуляриозу является содержание кремнезема (SiO_2), которое можно определять в листовых пластинах (проростков, вегетирующих растений), покровных чешуях зерновок риса. Кремний функционально играет важную роль в метаболизме растения. Присутствие его в тканях риса обеспечивает их высокую механическую прочность. Утолщение кремне-целлюлозного слоя эпидермальных тканей повышает устойчивость к болезням и вредителям. Сложный комплекс, который кремний образует с другими компонентами клеточной стенки, устойчив к энзимам патогена, что припятствует проникновению гиф гриба пирикулярии и других грибов внутрь клетки; кремний повышает окислительно-восстановительный потенциал клеточного сока риса, ингибируя развитие патогена. Определение содержания (SiO_2) в различных органах и тканях риса позволит отобрать и использовать затем в селекционной практике исходный материал с заведомо ценными признаками — устойчивостью к болезням и вредителям, к полеганию, к повышенным — пониженным температурам, к засолению и, как следствие, с повышенной продуктивностью.

Цель исследования

Изучить влияние содержание кремнезема в селекционных образцах риса на устойчивость к пирикуляриозу.

Материалы и методы

В качестве объектов исследования использовали сорта и сортообразцы коллекции ВНИИ риса. Содержание кремнезема определяли весовым методом [1].

Результаты и обсуждение

В листовых пластинах проростков сортов и сортообразцов риса содержание кремнезема различно. У устойчивых форм оно выше, чем у восприимчивых и варьирует в пределах от 4 до 7%. Так, устойчивые формы Аметист,