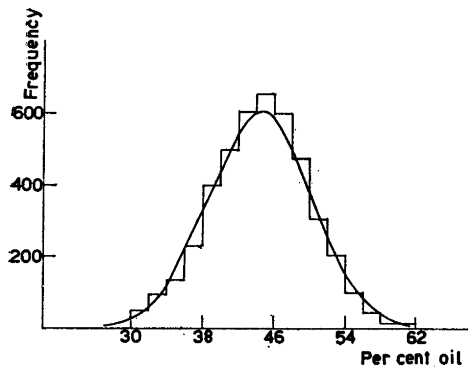

Fig. 2. Frequency distribution and theoretical normal distribution of percent oil in 4406 individual achenes of a sunflower variety (47 values < 29.5 %, *i.e.* $< \mathrm{m} - 2.5\ \sigma$, were excluded).

further showed that the peak value of the NMR signal is linearly related to the oil content of the corn seeds in case that the seeds contain 2 % or more of oil. The relative error in the oil determination was less than 1 % and the minimum quantity of oil which could be determined was 0.1 mg. The semiautomatic determination of the oil content in one seed together with the presentation of the result on a digital voltmeter takes about 5 to 10 sec. Details of the electronics will be published elsewhere. The method has been used now for five years in the Zemun Institute.

The frequency distribution of percent oil in single kernels of a sunflower variety is shown in Fig. 2. It may be noted that in this case where several thousand measurements of a biochemical property have been performed, good agreement with a normal distribution curve was obtained after elimination of a small number of extreme values ($< \mathrm{m} - 2.5\ \sigma$) probably representing immature seeds. In maize the single kernel differences in oil content within one and the same ear were found to be significantly heritable [4] in agreement with the results of other authors.[2] In a maize breeding programme the same increase in oil content has been reached in 4–5 generations as in 20–30 generations when conventional chemical methods were used.

As a continuation of this work, we are developing NMR and nuclear quadrupole resonance methods for a rapid nondestructive determination of the nitrogen content in seeds, within a plant breeding programme for higher protein content.

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Abscisin II as an Inhibitor of α-Amylase

TORSTEN HEMBERG

Botanical Institute, University of Stockholm, Lilla Frescati, Stockholm 50, Sweden

In 1961 Hemberg and Larsson [1] showed that the inhibitor β complex from resting potato tubers suppressed the activity of α-amylase but only insignificantly affected the activity of β-amylase. According to Cornforth *et al.*[2] the growth-inhibiting substance dormin, which is found in leaves of sycamore during early September when resting buds have been formed, is identical with the substance abscisin II. Cornforth *et al.*[3] have detected this substance in many different plant organs, including potato tubers. They are of the opinion that abscisin II causes the inhibitory activity found in the acid fraction of plant extracts.

Thomas *et al.*[4] find that the sycamore inhibitor inhibits the synthesis of α-amylase but seems to have no action on the activity of this enzyme. According to these findings

Table 1. The action of abscisin II on the activity of α- and β-amylases. Experimental volume 12 ml, thereof 5 ml 1.6 % starch solution. The starch in the α-amylase experiments was dissolved in 0.032 M sodium acetate buffer, pH 4.7; in the β-amylase experiments in 1/15 M phosphate buffer, pH 5.9. The concentration of the enzymes was 0.0167 mg/ml experimental solution. The maltose content was determined after 30 min. Experimental temperature 30°C.

α-amylase			β-amylase		
Molarity of abscisin II	mg maltose formed in 5 ml of the exp. solution	Inhibition %	Molarity of abscisin II	mg maltose formed in 5 ml of the exp. solution	Inhibition %
0	5.8, 5.5 → 5.7	—	0	6.2, 6.2 → 6.2	—
2.8×10^{-5}	2.6	54	2.8×10^{-5}	6.5	0
1.4×10^{-5}	2.3	60			
0	6.9, 6.8 → 6.9	—	0	11.2, 11.0 → 11.1; 10.7, 10.6 → 10.7; 11.1, 10.7 → 10.9	—
			0		
2.8×10^{-5}	3.2, 3.1 → 3.2	55			
1.4×10^{-5}	3.9, 4.1 → 4.0	42	1.4×10^{-5}	10.5, 10.6 → 10.6	0
0.7×10^{-5}	4.6, 4.8 → 4.7	32	0.7×10^{-5}	10.6, 10.9 → 10.8	0
0.35×10^{-5}	5.5, 5.8 → 5.7	17	0.35×10^{-5}	10.8, 10.5 → 10.7	0

the abscisin II should have a different action on α-amylase than that of the β-inhibitor. Even without going into the question of whether the β-inhibitor from resting potatoes is identical with abscisin II or not, it seemed to be of importance to investigate the possible effects of abscisin on α- and β-amylases with the same method as that used earlier by Hemberg and Larsson.[1]

The abscisin II used was synthetically prepared (±)-abscisin II. The enzymes studied were α- and β-amylases from the firm Theodor Schuchardt, Munich. The amylase activity was determined in the same way as by Hemberg and Larsson.[1] The experimental conditions are described in Table 1.

The results show clearly that abscisin II has an inhibiting action on the activity of α-amylase but not on that of β-amylase.

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