

BRIEF COMMUNICATIONS

DYNAMICS OF GLUCOMANNAN ACCUMULATION

IN *Narcissus poeticus*

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The primary structure of glucomannans (GM) from various *Narcissus* species is well studied [1, 2]. It has been demonstrated that the studied polysaccharides are linear, partially acetylated 1,4- β -glucomannans. However, the dynamics over vegetative phases and the extraction kinetics of GM have not been investigated.

We studied the dynamics of GM accumulation and the viscosity of polysaccharide solutions as functions of plant growth and development in order to find the period of maximal GM content in *N. poeticus* (Amaryllidaceae) bulbs. Plants were collected on the test site of the Institute. Air-dried ground bulbs that were sieved through a 0.25 mm sieve and stabilized by boiling alcohol (96°, 1:10) for one hour were analyzed.

GM were isolated by water extraction (1:10 and 1:5) at room temperature. The extracts were evaporated and precipitated with alcohol (96°, 1:3 ratio). The resulting solids were separated, washed with alcohol, and dried. Table 1 lists data for the GM yield.

It can be seen that the GM content increased from 2 to 6.4% with plant growth and development.

The viscosity was determined from the time for aqueous solutions of samples to flow through a capillary (0.73 mm diameter) in a VPZh viscosimeter (10 mL volume) at $26 \pm 0.5^\circ\text{C}$.

The change of characteristic viscosity of GM as a function of plant vegetative period showed that the viscosity was maximal when the aerial part was dying (03.06 [June 3]). GM with high molecular weights were probably accumulating at this time.

All samples (1-5) were soluble in water and did not give a color reaction with iodine. Therefore, they did not contain starchy glucan.

The kinetics of GM extraction were studied in order to establish its duration.

For this we used raw material (6 g) containing the largest amount of GM (03.06) that was obtained as described above. Equilibrium in the *N. poeticus* bulb:extractant system was established after 30 minutes of contact if the raw material was ground to a particle size of 0.25 mm (Fig. 1). GM did not increase further in the extract. This indicated that the limiting capabilities of the extraction method had been reached under these conditions.

Dissolution in water of *Narcissus* GM formed viscous solutions even at low concentrations (0.5%). Small changes in the concentration caused the viscosity to increase significantly. This is consistent with fibril-like macromolecules that are linked by H-bonds between them and water molecules.

TABLE 1. Dynamics of GM Accumulation in *N. poeticus* Bulbs by Vegetative Phases

Development phase	Collection date	GM yield of air-dried mass, %	η_{char} (1% water)
Growth of aerial part up to 3 cm	20.02	2.0	3.0
Runner formation, leaf height up to 10 cm	15.03	3.7	6.8
Flowering	3.04	4.3	7.7
Leaves semi-dried	2.05	5.2	8.4
Aerial part dying	3.06	6.4	9.2

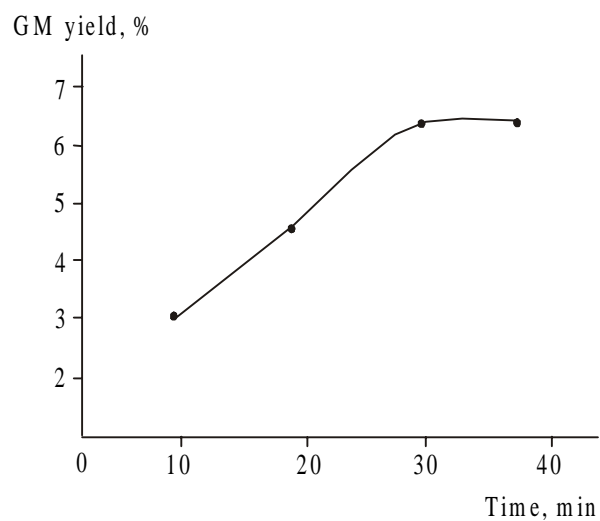


Fig. 1. Kinetics of GM extraction.

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REFERENCES

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