more, particularly after 60th day in kinetin treatment. It was also noted that all the treatments were effective in inducing tolerance to drought. Kinetin, resinsite and CCC were equally effective and better than hardening.

Between the stages, the lowest rates of transpiration were in the initial stage (20 days) while the highest rates were on the 60th day. The results were indicative of the fact that the chosen pretreatments can effectively reduce the transpiration rates, although the actual mechanism needs to be investigated. Genkel and Badanova\(^1\), recorded higher rate of transpiration in hardened plants. Genkel\(^2\) attributed this situation to more intense transpiration and more water deficit which were due to more bound water and greater xeromorphic structure.

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**INSOLUBLE POLYSACCHARIDES IN FOENICULUM OVULES**

In the Umbelliferae, the cells of inner epidermis of ovular integument develop into endothelium-like cells, but the presence of a functional endothelium has been doubted earlier.\(^1\) Hence, qualitative histochemical studies of ovules have been undertaken for the in situ localization of insoluble polysaccharides, proteins, nucleic acids, histones, etc. The present communication reports only the distribution of insoluble polysaccharides of total carbohydrates in developing ovules of fennel.

Flower buds at different developmental stages were fixed in formalin-acetic-alcohol. The usual paraffin method was followed for microtomy. Sections of thickness between 6-10 microns were cut. One set of slides was stained with safranin-fast green and the other was treated with periodic acid Schiff’s (PAS) reaction. Controls were run by (i) omitting the periodic acid treatment and (ii) by acetylation. In Foeniculum vulgare, the ovules are unigemar and tenuinucellate. The endothelium differentiates at 2-nucleate stage of embryo sac when its cells appear slightly radially elongated.

However, the cytoplasm is not dense enough to recognize this layer distinctly. At 4-nucleate stage, the cells get further elongated and persist up to 8-nucleate stage of embryo sac. It remains uninucleate all though and starts disintegrating after fertilization. Thus, the integumentary tapetum has a short life span.

Total insoluble polysaccharides are uniformly distributed in an undifferentiated ovule. As the archesporial cell is organised in the nucellus, its cytoplasm develops light PAS-positive tinge. Concurrently, the PAS-positive grains start appearing in the integumentary initials and also at the chalazal end of the ovule (Fig. 1). At 2-nucleate embryo sac stage, polysaccharide grains are concentrated more at the micropylar end of the ovule, 3 or 4 cell layers adjoining the endothelium, and the outer epidermal cells of the integument, but comparatively fewer in the endothelium (Fig. 2). Later, as the endothelia’ cells elongate, their cytoplasm as well as walls stain equally well like the rest of the integumentary cell’s. Simultaneously, at the 4-nucleate stage, in the micropylar end of the integument the density of PAS-positive grains declines.

The ovule, on the whole, becomes more PAS-positive at organised embryo sac stage. Uniform intense stain for polysaccharides appears in the cytoplasm of endothelium and adjoining 4-6 layers of cells, but they lack PAS-positive grains altogether. However, the polysaccharides accumulate in the form of grains in the outer peripheral cell layers of the integument, excepting a few cell layers on the raphe side which persist in the mature seed (Fig. 3). After fertilization the endothelial ce’ls start breaking down but the zygote shows accumulation of polysaccharide grains. The PAS-positive grains increase remarkably in the peripheral ce’llayers of integument. The density of these grains decreases gradually centripetally (Fig. 4). Concomitantly, the inner ce’llayers of integument, adjacent to embryo sac, become devoid of the grains but their cytoplasm stains dark with PAS-reaction. Thus, a clear centrifugal gradient is set up in the integumentary cells, indicating the utilization of polysaccharides by the developing endosperm.

The integument gets depleted off of its polysaccharides at globular embryo stage. The cell’ular endosperm develops a high polysaccharide content which is concentrated more in its micropylar half. Some of the ce’ls of endosperm in the vicinity of embryo, start breaking down, and their cytoplasm stains darker. This is accompanied by a gradual increase of polysaccharides in the globular embryo (Fig. 5). Subsequently, the grains in the endosperm ce’ls disappear but the cytoplasm assumes uniformly
dense PAS-positive stain. Concomitantly, the embryo acquires high concentration of PAS-positive material, indicating the utilization of polysaccharides from its surrounding tissues.

Figs. 1–5. Distribution of insoluble polysaccharides in Foeniculum vulgare ovules. Fig. 1. L.s. ovule at archesporial cell stage. X 312. Fig. 2. Same, at 2-nucleate embryo sac stage, X 371. Fig. 3. Same, at organised embryo sac stage. The PAS-positive grains are deposited at micropylar and chalazal ends, X 182. Fig. 4. Same, zygote showing PAS-positive grains. Note the accumulation of grains in the peripheral integumentary cell layers, whereas inner cell layers lack the grains completely, X 304. Fig. 5. Same, showing the globular embryo rich in polysaccharides; the endosperm cells in the vicinity of embryo are breaking down.

(e, embryo; en, endosperm; es, embryo sac; et, endothelium; i, integument; ii, integumentary initials; z, zygote.)
Thus, the present histochemical observations indicate that at least in *Foeniculum vulgare*, the endothelium is short lived. The distribution pattern of insoluble polysaccharides in endothelium shows that it does not differ significantly from other adjoining integumentary tissues and on the whole it is probably not very active. Nevertheless, it is evident that the insoluble polysaccharides, initially deposited in the integument are used up by the developing embryo through the intermediate nourishing tissue, the endosperm.

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**SHORT SCIENTIFIC NOTES**

Inheritance of Anthocyanin Pigment in Linseed (*Linum usitatissimum*) Seedlings

Development of anthocyanin pigment was marked in several varieties of linseed seedlings. Varieties Neelum and EC. 77918 with pink seedlings in crosses with green seedling types, EC. 41599, EC. 1458 and EC. 12351 showed the monogenic dominance of pink pigmentation in seedlings. No segregation occurred when varieties within the same pigment groups were mated indicating the presence of the same gene for anthocyanin pigment. Pink seedling colour of Neelum—a released cultivar—can be used as a genetic marker in the purification of the variety as well as in the hybridization programme. These results have not been reported so far in linseed.

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A New Leaf-Spot Disease of *Capparis horrida* L.

During the course of an investigation on plant pathogenic fungi of District Jaunpur, infected leaves of *Capparis horrida* showing the presence of blackish patches on their surface, were collected during June–July, 1974.

Microscopic examination of the material revealed the presence of pycnia, which were densely scattered and embedded in the upper and lower surfaces of the leaf lamina. The pycnia were dark-brown to black in colour, sub-epidermal, globose to sub-globose 162–215 μ in diameter, thick (30–60 μ) walled, and composed of 5–7 layers of elongated polyhedral brown cells; ostiolar, ostiolar 20–40 μ wide and usually 45 μ in length; condiophores hyaline, minute, 7.5–10.5 μ in length and 7.5–1 μ in thickness. Conidia very minute, densely filling the cavity of the pycnidium.

The fungus has been identified as *Leptodothyrella sp.*, the spermatial state of *Gignardia creberrima* Syd. by Dr. Punithalingam of C.M.I., Kew. Based on the perfect state the fungus may be named as *Leptodothyrella creberrima*.

The specimen has been deposited in C.M.I., Kew, at No. S2 (IMI, 194875).

The fungus is a new record for India, and *Capparis horrida* is a new host record for this fungus.

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 Responses of Seeds and Isolated Embryos of *Codiaeum variegatum* Blume var. 'Karna' in *vitro*

The potentialities of endosperm for continuous growth and morphogenesis have been well established species. This note describes the in *vitro* in several responses of decoated seeds and isolated embryos of *Codiaeum variegatum* Blume var. 'Karna'. Following the aseptic technique, the cultures were raised