

PHYSIOLOGY OF FLUSHING AND SPIKING IN PIPER NIGRUM

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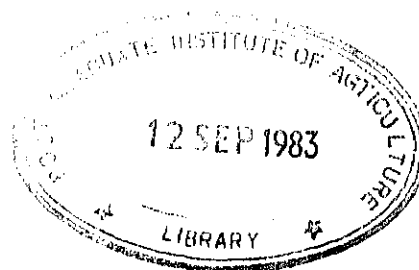
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ABSTRACT

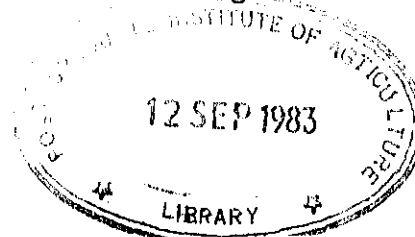
The woody climber, pepper, exhibits dimorphic branching during its growth; "Orthotropic" vegetative climbing shoots and "Plagiotropic" fruiting branches. The erect growing orthotropic shoots show continuous terminal extension growth while the laterally growing plagiotropic shoots show slower growth and pass through distinct phases of growth; the dormant stage, the leaf-bud initiation stage, flushing stage and terminate in the spiking stage. More leaves are found on plagiotropic shoots than on orthotropic shoots as they branch freely. Varietal differences are also seen in the habit of growth.

In this study an attempt was made to investigate the growth rate of leaves and internodes (stems) of plagiotropic shoots in two varieties, Panniyur-1 and Kuching. The total nitrogen and amino acid contents were determined in immature and mature leaves, stems and spikes. Analysis of endogenous growth regulators in orthotropic and plagiotropic shoots were also carried out in variety Panniyur-1. These determinations were done in orthotropic and plagiotropic shoots at the dormant, leaf-bud initiation, flushing and spiking stages; in the case of the non-spiking orthotropic shoots, samples for the spiking stage were those obtained at the stage corresponding to that of spiking in the plagiotropic shoots.



Growth measurements indicated that Panniyur-1 was a vigorously growing variety, affected by soil and climatic factors to a greater degree than Kuching. Kuching had a higher content of total nitrogen compared to Panniyur-1. Both varieties showed depletion of total nitrogen with maturity of leaves while these levels increased in mature spikes. In Panniyur-1, high levels of amino acids were seen in the immature leaves and spikes while in Kuching these levels were high in the mature leaves and spikes. In both varieties, immature and mature stems had almost equal amounts of amino acids. About twenty ninhydrin positive amino acids were detected among which asparagine, alanine and γ -amino butyric acid were the predominant ones.

Analysis of endogenous plant growth regulators showed fluctuations in their levels at the different stages of growth of the vines. The orthotropic shoots had relatively high levels of auxins, gibberellins and cytokinins at the dormant stage, while the levels of these were low in plagiotropic shoots, especially that of gibberellins. At the leaf-bud initiation stage the auxin and gibberellin levels in orthotropic shoots were depleted while the level of cytokinins remained almost steady. The plagiotropic shoots showed an increase in the levels of auxin-like substances. In the plagiotropic shoots the level of cytokinin-like substances decreased at this stage.



At the flushing stage auxin-like substances started building up in orthotropic shoots and increased to higher amounts at the stage of spiking. The free branching plagiotropic shoots had low levels of auxin-like substances at the flushing stage which showed an increase at the spiking stage. Gibberellin-like substances remained low in orthotropic shoots at the flushing and spiking stages, while their levels increased in the plagiotropic shoots. Cytokinin-like substances increased in orthotropic shoots at the spiking stage.