

REFERENCES

- Ahmad, Z. and Kalimullah Khan. 1986. Effect of air pollution on the composition of bark in Mangifera indica. J. Tree. Sci. 5: 134-135.
- Ahmad, Z. and Kalimullah Khan. 1988. Impact of air pollution on the anatomy of bark of some economically important trees. J. Tree. Sci. 7: 58-60.
- Ajmal, S. and M. Iqbal. 1987a. Annual rhythm of cambial activity in Streblus asper. IAWA Bull. 8: 275-283.
- and----- . 1987b. Seasonal rhythms of structure and behaviour of vascular cambium in Ficus rumphii. Ann. Bot. 60: 649-656.
- Aljaro, M. E., E. Avila., E. Hoffman and J. Kummerow. 1972. The annual rhythm of cambial activity in two woody species of the Chilean "Matorral". Amer. J. Bot. 59: 879-885.
- Alscher, R. G., R. G. Amundson., J. R. Cummings., S. Fellows., J. Finscher., G. Rubin., P. Van Leuken and S. L. H. Weinstein. 1989. Seasonal changes in the pigments, carbohydrates and growth of red spruce as affected by ozone. New Phytol. 113: 211-223.
- Amobi, C. C. 1974. Periodicity of wood formation in twigs of some tropical trees in Nigeria. Ann. Bot. 38: 931-936.
- Amundson, R. G., R. B. Walker., H. U. Schellhase and A.H. Legge. 1990. Sulfur gas emissions in the boreal forest. The west white court case study. VIII. Pine tree mineral nutrition. Water, Air and Soil pollution 60: 219-232
- Antonova, G. F. and V. V. Stasova. 1988. Formation and development of tracheids in the annual rings of Larix sibirica stem wood. Bot. Zhur. 73: 1130-1140.
- Aszimutat, H., Ch. Koltzenburg and W. J. Weisz. 1986. Untersuchung der Holzeigenschaften von fichte und Buche aus immissionsexponierten bestanden von hils und solling. Holz als Roh.und werkstoff. 44: 301.
- Badola, H. K., S. P. Paliwal and G. S. Paliwal. 1989. Dormancy and spring activation of cambium in some Himalayan tree species. In: Second Pacific Regional Wood Anatomy Conference. October 15-21. 1989. College Laguna, Philippines. IAWA Bull. 10: 334.
- Bailey, I.W. 1923. The cambium and its derivative tissues. IV. The increase in girth of the cambium. Amer. J. Bot. 10: 499-509.

- Balsberg-Pahlsson, A. M. 1989. Effects of heavy metal and sulfur dioxide pollution on the concentrations of carbohydrates and nitrogen in tree leaves. *Can. J. Bot.* 67: 2106-2113.
- Bannan, M. W. 1953. Further observations on the reduction of fusiform cambial cells of Thuja occidentalis L. *Can. J. Bot.* 31: 63-74.
- Bass, P., Lee Chenglee., Zhang Xinying., Cui Kemming and Deng Yuefen. 1984. Some effects of dwarf growth on wood structure. *IAWA Bull.* 5: 45-63.
- Bauch, J., P. Klein., A. Fruhwald and H. Brill. 1979. Alteration of wood characteristics in Abies alba Mill. due to 'fir-dying' and considerations concerning its origin. *Eur. J. Path.* 9: 321-331.
- Bauch, J. 1986. Characteristics and responses of wood in declining trees from forests affected by pollution. *IAWA Bull.* 7: 269-276.
- Berlyn, G. P. and J. P. Miksche. 1976. Botanical Microtechnique and Cytochemistry. The Iowa State Univ. Press. Ames. Iowa.
- Bialbok, S. 1989. Evaluation of injury to trees and shrubs exposed to sulfur dioxide in open field chambers. *Arbor. Kornickie.* 31: 259-267.
- Biggs, A. R. and D. D. Davis. 1981. Effect of sulfur dioxide on growth and sulfur content of hybrid poplar. *Can. J. For. Res.* 11: 830-833.
- Bosshard, H. H., L. Kucera., A. Stoll and K. Mochfegh. 1986. Holzkundliche und holztechnologische untersuchungen an geschadigten fichten und Tannen. Schweiz. Ztschr. For. Wesen. 137: 463-478.
- Brett, D. W. 1983. Records of temperature and drought in London's park trees. *Arbor. Jr.* 7: 63-71.
- Catesson, A. M. 1974. Cambial cells. In: Dynamic Aspects of Plant Ultrastructure. Ed. A. W. Robards. Mc Graw Hill Book Company (U.K.) limited, England. pp. 358-386.
- Cha, Y. J. and K. J. Lee. 1991. Relationship between air pollution by sulfur dioxide and soluble sulfur contents in the leaves and bark pH in urban forest trees. *J. Kor. For. Soc.* 80: 279-286.
- Chalk, L. 1930. The formation of spring and summer wood in ash and fir. *Oxford Forest. Mem* 10: 1-44.
- Cheadle, V.I., E. M. Gifford Jr. and K. Esau. 1953. A staining combination for phloem and contiguous tissues. *Stain Technol.* 28: 49-53.

- Chou, T. and S. H. T. Chiang. 1973. Seasonal changes of cambial activity in the young branch of Psidium guajava. L. Taiwania 18: 35-41.
- Chowdhary, K. A. 1969. Cambial activity in temperate and tropical trees. XI Int. Bot. Cong. Seattle. Abstract-32.
- Danilova, M. F., I. M. Kravkina., R. E. Kreng and D. Pechak. 1987. Ultrastructure of stomata and leaf surface in Populus deltoides (Salicaceae) under the influence of sulfur dioxide. Bot. Zhur. 72: 1187-1192.
- Dave, Y. S. and K. S. Rao. 1982a. Cambial activity in Mangifera indica L. Acta. Bot. Acad. Sci. Hung. 28: 73-79.
- and ----- . 1982b. Seasonal activity of the vascular cambium in Gmelina arborea Roxb. IAWA Bull. 3: 59-65.
- Davis, J. D. and R. F. Evert. 1965. Phloem development in Celastrus scandens. Amer. J. Bot. 53: 616 (Abstr).
- Denne, M. P. and C. J. Atkinson. 1987. Reactivation of vessel expansion in relation to bud break in sycamore (Acer psuedoplatanus) trees. Can. J. For. Res. 17: 1166-1174.
- Derr, W. F. and R. F. Evert. 1967. The cambium and seasonal development of phloem in Robinia pseudoacacia. Amer. J. Bot. 54: 147-153.
- Douglas, T. J. and L. G. Paleg. 1981. Lipid composition of Zea mays seedlings and water stress induced changes. J. Exp. Bot. 32: 499-508.
- Drossopoulos, J. B. and C. A. Niavis. 1988. Seasonal changes of the metabolites in the leaves, bark and xylem tissues of Olive tree (Olea europea.L.) II. Carbohydrates. Ann. Bot. 62: 321-327.
- Dudzinska, R. T. 1990. Change of the breast height diameter growth rate in pine stands growing under the influence of industrial emissions. Annal. Warsaw. Agri. Univ. Forestry and Wood Technology 40: 27-34.
- Eckstein, D., U. Greeve and A. Fruhwald. 1981. Anatomische und mechanisch technologische Untersuchungen am Holz einer sulfur dioxide geschadigten Fichte und Tanne. Holz als Roh- Und Werkstoff. 39: 477-487.
- Eklavya, C. 1979. A technique for making CBB stained sections of paraffin and resin embedded tissue permanent. Ind. J. Bot. 2: 73-75.
- Esau, K. 1948. Phloem structure in the grapevine and its seasonal changes. Hilgardia 18: 217-296.

- Esau, K. 1977. Anatomy of Seed Plants. 2nd ed. John Wiley, New York.
- Essiamah, S. and W. Eschrich. 1985. Changes of starch content in the storage tissues of deciduous trees during winter and spring. IAWA Bull. 6: 97-106.
- Evans, S. L. and P. R. Miller. 1972. Ozone damage to ponderosa pine: A histological and histochemical appraisal. Amer. J. Bot. 59: 297-304.
- Evert, R. F. 1961. Some aspects of cambial development in Pyrus communis. Amer. J. Bot. 48: 479-488.
- Fahn, A. 1990. Plant Anatomy. 4th ed. Pergamon Press, Oxford.
- Feder, N. and T. P. O'Brien. 1968. Plant Microtechnique. Some Principles and New Methods. Amer. J. Bot. 55: 123-142.
- Feder, N. and T. P. O'Brien. 1968. Plant Microtechnique. Some Principles and New Methods. Amer. J. Bot. 55: 123-142.
- Fengel, D. and H. Schulz. 1986. Chemical studies on the wood of declining conifers. IAWA Bull. 79: 371-373.
- Fiedler, H. J., G. Baronius and F. Ehrig. 1990. Scanning electron microscope and chemical analysis of green and chlorotic needles from a Scots pine stand damaged by air pollution. Flora 184: 91-101.
- Fink, S. 1986. Microscopical investigations on wood formation and function in diseased trees. IAWA Bull. 7: 351-355.
- Forschner, W., V. Schmitt and A. Wild. 1989. Investigations on the starch content and ultrastructure of spruce needles relative to the occurrence of novel forest decline. Bot. Acta. 102: 208-221.
- Foster, A. S. 1934. The use of tannic acid and iron chloride for staining cell walls of meristematic tissues. Stain Technol. 9: 91-92.
- Fox, C. A., W. B. Kincaid., T. H. Nash III., D. L. Young and H.C. Fritts. 1986. Tree ring variation in western larch (Larix occidentalis) exposed to sulfur dioxide emissions. Can. J. For. Res. 16: 283-292.
- Frelich, L. E., J. G. Bockheim and J. E. Leide 1989. Historical trends in tree ring growth and chemistry across an air quality gradient in Wisconsin. Can. J. For. Res. 19: 113-121.
- Fritts, H. C. 1976. Tree Rings and Climate. Academic Press, London.

- Fruhwald, A., J. Bauch and H. Gottsche-Kuhn. 1984. Holzeigenschaften von Fichten aus Waldschadengebieten. Holz als Roh- und Werkstoff. 42: 441-449.
- Fruhwald, A. 1986. Technological properties of wood from trees in polluted regions. IAWA Bull. 7: 389-397.
- Fullford, G. B. and F. Murray. 1990. Morphogenic changes in Eucalyptus gomphocephala exposed to sulfur dioxide. Environmental and experimental Botany 30: 343-347.
- Gersani, M. and T. Sachs. 1990. Perception of gravity expressed by vascular differentiation. Plant Cell and Environ. 13: 495-498.
- Ghouse, A. K. M. and M. Yunus. 1972. An example of the stratified cambium among the indigenous tropical trees. Curr. Sci. 41: 569- 570.
- and ----- . 1974. A new record on the occurrence of stratified cambium in the family Mimosaceae. Geobios 1: 138.
- Ghouse, A. K. M. and S. Hashmi. 1979. Cambium periodicity in Polyalthia longifolia. Phytomorphology 29: 64-67.
- and ----- . 1983. Periodicity of cambium and the formation of xylem and phloem in Mimusops elengi.L., an evergreen member of tropical India. Flora 173: 479-487.
- Ghouse, A. K. M., F. A. Khan and M. J. Pasha. 1984a. Effect of air pollution on wood formation in Dalbergia sissoo, a timber tree of Gangetic plain. J. Tree. Sci. 3: 140-142.
- Ghouse, A. K. M., F. A. Khan., M. Salahudin and M. A. Rasheed. 1984b. Effect of air pollution on wood formation in Tectona grandis. Ind. J. Bot. 7: 84-86.
- Glavac, N. 1988. Reductions in leaf size in beach forests damaged by air pollution. Allgemeine Forstzeitschrift. 29: 813-814.
- Gould, R. P., R. E. H. Minchin and P. C. Young. 1988. The effects of sulfur dioxide on phloem transport in two cereals. J. Exp. Bot. 39: 997-1007.
- Grosser, D., H. Schulz and H. Utschig. 1985. Mogliche anatomische veränderungen in erkrankten nadelbaumen. Holz als roh und werkstoff 43: 315-323.
- Grunwald, C. 1981. Foliar fatty acids and sterols of soyabean field fumigated with sulfur dioxide. Plant Physiol. 68: 867-871.
- Guenthardt Georg., S. Madeleine., Rainer Matyssek., Christoph Scheidegger and T. Keller. 1993. Differentiation and struc-

- tural decline in the leaves and bark of birch (Betula pendula) under low ozone concentration. Trees 7: 104-114.
- Halle, F., R. A. A. Oldman and P. B. Tamlinson. 1978. Tropical Trees and Forests - An Architectural Analysis. Springer-Verlag. New York.
- Hasemann, G. and A. Wild. 1990. The lose of structural integrity in damaged spruce needles from locations exposed to air pollution. I. Mesophyll and central cylinder. J. Phytopathology 128: 15-32.
- Inamdar, J. A. and G. S. Chaudhari. 1984. Effects of environmental pollution on leaf epidermis and leaf architecture. J. Plant Anat. Morphol. 1:1-8.
- Ingrid de Kort. 1986. Wood structure and growth ring width of vital and non vital Douglas fir (Psuedotsuga menziesii) from a single stand in Netherlands. IAWA Bull. 7: 309-318.
- Iqbal, M. 1990. Vascular Cambium. Res. Stu. Press. Tauton and John Wiley. New York.
- Irena, K., D. Janous., M. Marek., M. Bartak and L. Riha. 1989. Production activity of mountain cultivated Norway spruce stands under the impact of air pollution. I. General description of problems. Ekologia 8: 407-419.
- Isakov, V. N. 1987. Ecological variability in the leaf morphology of some woody species. Trudy latviiskoi Sels Kokhozyai stvennoi Akademii 242: 41-47.
- Jagels, R. 1986. Acid fog, ozone and low elevation spruce decline. IAWA Bull. 7: 299-307.
- Jager, H. J., H. J. Weigel and Gruenhage. 1986. Physiological and biochemical aspects of the impact of air pollutants on forest trees. Eur. J. For. Path. 16: 98-109.
- Jacuks, P. and K. Babos. 1988. Local industrial emission and forest dieback in northern Hungary. IV. Annual ring width and tracheal obstruction in healthy and diseased Quercus petrae stems. Acta Botanica Hungarica 34: 51-64.
- Jensen, W. A. 1962. Botanical Histochemistry., W. H. Freeman & Co., San Francisco.
- Jensenk. K. 1985. Response of yellow poplar (Liriodendron tulipifera) seedlings to intermittant fumigation. Environ. pollut. Ser. Aecol. Biol. 38: 83-191.
- Johansen, D. A. 1940. Plant Microtechnique. McGraw-Hill. New York.

- Kagamimori, S., T. Katoh., Y. Naruse., H. Kakiuchi., I. Matsubara., M. Kasuya and S. Kawano. 1990. An ecological study on air pollution: Changes in annual ring growth of the Japanese cedar and prevalence of respiratory symptoms in school children in Japanese rural districts. *Environmental Research* 52: 47-61.
- Kalimullah, M. and Z. Ahmad. 1987. Impact of air pollution on the radial system of bark in Mangifera indica Roxb. *Indian. J. Appl. and Pure Biol.* 2: 49-50.
- Keller. T. 1980. The effect of a continuous spring time fumigation with sulfur dioxide on carbon dioxide uptake and structure of the annual ring in spruce. *Can. J. For. Res.* 10: 1-6.
- . 1988. Growth and premature leaf fall in American aspen as bioindicators for ozone. *Environmental Pollution* 52: 183-192.
- Kitin Pet, R. 1992. Dynamics of the cambial divisions in the early and late flushing forms of common oak Quercus robur f. Praecox czern and Quercus robur tardiflora (Zern) in the park of freedom Sofia. *Nauk Gorata* 27: 3-13.
- Kocon, J. 1991. Influence of nitrogen oxides, sulfur oxides and acid rains on the persistence of the needles of Silver Fir and Norwegian Spruce. *Ann. Wars. Agri. Univ. For. And Ward. Techn.* 41: 101-104.
- Kozlowski, T. T. 1962. Photosynthesis, climate and tree growth. In: *Tree Growth*, ed. T. T. Kozlowski. New York. pp. 149-164.
- . 1971. *Growth and Development of Trees*. Vol. II. Academic Press, New York.
- Kozlowski, T. T. 1982. Water supply and tree growth. I. Water deficits. *For. Abst.* 43: 57-95.
- Kozlowski, T. T. and H. A. Constantinidou. 1986. Environmental pollution and tree growth Part I. Sources and types of pollutants and plant responses. *For. Abstr.* 47: 5-51.
- Krammer, P.J., and T. T. Kozlowski. 1979. *Physiology of Woody Plants*. Academic Press, New York.
- Krapfenbauer, A., J. Bodner and T. Knoll. 1985. Anomalien bei der Ausbildung der Janrringe, der Hoftupfel und Tracheiden bei immission geschadigten, Fichten. *Centralblatt Ges. Forstwesen* 102: 150-160.
- Krishnamurthy, K. V. and N. Venugopal. 1983. A comparative study of vascular cambium and its derivatives in young and old stems of Dalbergia sissoo Roxb. *S. B. Cl. News Letter.* 2: 21-31.

- Krishnamurthy, R., T. Srinivas and K. A. Bhagwat. 1994. Effect of air pollution on some bund trees of the agricultural lands. *J. Environ. Biol.* 15: 97-106.
- Krishnayya, N. S. R. 1989. Effect of industrial air pollution on some tree species. Ph. D. Thesis, M. S. University of Baroda, Baroda.
- Krishnayya, N. S. R. and S. J. Bedi. 1986. Effect of automobile lead pollution on Cassia tora L. and Cassia occidentalis L. *Environ. Pollu.* 40: 221-226.
- Krishnayya, N. S. R. and S. J. Bedi. 1989. Effect of sulfur dioxide and ascorbic acid on the plastid ultrastructure of Azadirachta indica leaves. *Ann. Bot.* 64: 311-313.
- Kumar, H. D. 1981. Modern Concepts of Ecology. Vikas Publishing House Pvt. Ltd. New Delhi.
- Larson, P. R. 1964. Contribution of different aged needles to growth and wood formation of young red pines. *Forest Science.* 12: 225.
- Larson, P. R. 1973. The physiological basis for wood specific gravity in conifers. IUFRO Div. 5 Meet. Proc. 2: 672-680.
- Leuthy-Krausse, B. and W. Landolt. 1990. Effects of ozone on starch accumulation in Norway spruce (Picea abies). *Trees* 4: 107-110.
- Linzon. 1971. Economic effects of sulfur dioxide on forest growth. *J. Air Pollut. control Assoc.* 21: 81-86.
- Little, C. H. A. and P. F. Wareing. 1981. Control of cambial activity and dormancy in Picea sitchensis by indole-3-acetic acid and abscisic acids. *Can. J. Bot.* 59: 1480-1493.
- Little, C. H. A. and R. A. Savidge. 1987. The role of plant growth regulators in forest tree cambial growth. In: Hormonal Control of Tree growth. Proceedings of the physiology working group Technical session. Society of American Foresters National Convention, Birmingham, Alabama, USA, Oct. 6-9. 1986. (ed. Kosuth, S. V. and Ross, S. D). Dordrecht, Netherlands. Martinus Nijhoff Publishers. pp. 137-169.
- Ljudevit, I., H. Vladimir., J. Zeljka and H. Jasminka. 1989. Influence of air pollution on the bark pH values in the regions of Zagreb and Sisak. *Act. Bot. Croat.* 48: 63-73.
- Lu, C. Y. and S. H. T. Chiang. 1975. Seasonal activity of the cambium in the young branch of Liquidambar formosana Hance. *Taiwania* 20: 32-47.

- Malhotra, S. S. and A. A. Khan. 1978. Effects of sulfur dioxide fumigation in lipid biosynthesis in pine needles. *Phytochemistry* 17: 241-244.
- Masuch, G., H. G. Kicinski., W. Dulme and A. Kettrup. 1989. Hydrogen peroxide dissolved in acidic fog as air pollutant effects on spruce needles. *International Jr. Env. Anal. Chem.* 37: 161-185.
- Maurrosset, L., P. Raymond., M. Gaudillere and J. L. Bonnemain. 1992. Mechanism of the inhibition of phloem loading by sodium sulfite: Effect of the pollutant on respiration, photosynthesis and energy charge in the leaf tissues. *Physiol. Plant.* 84: 101-105.
- Mazia, D., P. A. Brewer and M. A. Alfert. 1953. The cytochemical staining and measurement of protein with MBB. *Biol. Bull.* 104: 57-67.
- Mc Clenahan, J. R. and J. P. Vimmerstedt. 1993. Soil, climate and atmospheric deposition relationships with elemental concentration in annual rings of tulip tree. *J. Environ. Qual.* Madison 22: 23-32.
- Mejnartowicz, E. L. and Andrzej L. D. 1985. Effect of flourides and sulfur dioxide on pollen germination and growth of pollen tube. *Act. Bot. Pol.* 54: 125-130.
- Mejnartowicz, E. L. and H. Lukasiak. 1985. Level of sugars in scots pine trees of different sensitivity to flouride and sulfur dioxide. *Eur. J. For. Path.* 15: 193-198.
- Michalak, K. and K. Siekierski. 1991. Pattern of the diameter increment along the stem in pine stands of the Swier Klaieć Chief Forestry. *Ann. Warsaw. Agri. Uni.* 41: 27-36.
- Mudd, J. B. and T. T. Kozlowski. 1975. Responses of Plants to Air Pollution. Academic Press. New York.
- Niedzielska. B. 1987. Effect of air pollution on the anatomical structure of scots pine wood growing within range of emissions from the Boleslaw Steelworks near Olkusz. Poland. *Acta. Agraria et Silvestria, Silvestris* 25: 131-140.
- O' Brien, T. P., N. Feder and M. E. Mc Cully. 1964. Polychromatic staining of plant cell walls by Toluidine blue O. *Protoplasma* 59: 367-373.
- Odum, E. P. 1971. Fundamentals of Ecology: Saunders International Students Edition, Philadelphia.
- Paliwal, G. S. and N. V. S. R. K. Prasad. 1970. Seasonal activity of cambium in some tropical trees. I. Dalbergia sissoo. *Phyto-morphology* 20: 333-339.

- Paliwal, G. S., N. V. S. R. K. Prasad., V. S. Sajwan and S. K. Agarwal. 1975. Seasonal activity of cambium in tropical trees. II. Polyalthia longifolia. Phytomorphology 25: 478-484.
- , V. S. Sajwan and S. K. Agarwal. 1976. Seasonal activity of cambium in some tropical trees. III. Salvadora persica. L. Acta. Soc. Bot. Pol. XLV: 303-312.
- Paliwal, S. P. and G. S. Paliwal. 1990. Influence of climatic variations on the seasonal behaviour of the vascular cambium in some Himalayan trees. III. Rhododendron arboreum. Smith. Phytomorphology 403: 257-271.
- Patel, J. D. and G. S. Devi. 1985. Studies on leaf epidermis of some angiosperm species growing under pollution stress of a fertilizer complex. J. Plant Anat. Morphol. 2: 1-10.
- and ----- . 1986. Variations of starch, insoluble polysaccharides and lipid contents in bark and wood of trees growing under the air pollution stress of a fertilizer complex. Phytomorphology 36: 73-78.
- Percy, K. E. and R. T. Riding. 1981. Histology and histochemistry of elongating needles of Pinus strobus subjected to long duration, low concentration exposure of sulfur dioxide. Can. J. Bot. 59: 2558-2567.
- Petitte, J. M. and D. P. Ormorod. 1992. Sulfur dioxide and nitrogen dioxide affect growth, gaseous exchange and water relations of pollutants. J. Am. Soc. Hort. Sci. 117: 146-153.
- Philipson, W. R., J. M. Ward and B. G. Butterfield. 1971. The Vascular Cambium: Its Development and Activity. Chapman & Hall, London.
- Priestly, J. H. 1930. Studies in the physiology of cambial activity. III. The seasonal activity of the cambium. New Phytol. 29: 316-354.
- Rao, K. S. 1981. Seasonal and Ultrastructural studies in the cambium of some tropical trees. Ph.D. Thesis. Sardar Patel University, Vallabh Vidyanagar.
- Rao, K. S. 1988. Cambial activity and developmental changes in ray initials of some tropical trees. Flora 181: 425-434.
- Rao, K. S. and Y. S. Dave. 1981. Seasonal variations in the cambial anatomy of Tectona grandis (Verbenaceae). Nord. J. Bot. 1: 535-542.
- and ----- . 1983a. Seasonal variations in the vascular cambium of Holoptelea integrifolia (Ulmaceae) Beitr. Biol. Pflanzen 59: 321-331.

- and -----, 1983b. Seasonal Histochemical Changes in the Cambium of Tectona grandis L.f. and Gmelina arborea Roxb. *Biologia Plantarum* 25: 241-245.
- and -----, 1985. Developmental changes in fusiform cambial cells of some tropical trees. *Flora* 177: 187-194.
- Rao, M. V. and P. S. Dubey. 1990. Biochemical aspects (anti-oxidants) for development of tolerance in plants growing at different low levels of ambient air pollutants. *Env., Pollu.* 64: 55-66.
- Reeve, R. M. 1951. Histochemical tests for polyphenols in plant tissues. *Stain Technol.* 26: 91-96.
- Renzoni, G. C., L. Viege., A. Stefani and A. Onnis. 1990. Different in vitro germination responses in Pinus pinea in vitro pollen from two localities with different levels of pollution. *Annales Botanici Fennici* 27: 85-90.
- Roberts, B. R. and W. N. Cannon Jr. 1989. Changes in xylem pressure potential of red spruce seedlings treated with ozone and simulated acid rain. *Can. J. For. Res.* 19: 1200-1203.
- Sajwan, V. S. and G. S. Paliwal. 1976. Occurrence of stratified cambium in Salvadora persica L. *Curr. Sci.* 45: 267-268.
- Sanders, G. E., J. J. Colls and A. G. Clark. 1992. Physiological changes in Phaseolous vulgaris in response to long term ozone exposure. *Ann. Bot.* 69: 123-131.
- Savidge, A. 1989. Coniferin, a biochemical indicator of commitment to tracheid differentiation in conifers. *Can. J. Bot.* 67: 2663-2668.
- Savidge, R. A. and P. F. Wareing. 1984. Seasonal cambial activity and xylem development in Pinus contorta in relation to endogenous IAA and ABA levels. *Can. J. For. Res.* 14: 676-686.
- Saxe, H. and N. S. Murali. 1989. Diagnostic parameters for electing against novel spruce (Picea abies) decline. IV. Responses of photosynthesis and transpiration to sulfur dioxide and nitrogen oxide exposures. *Physiol. Plant.* 76: 362-367.
- Schulz, H., E. Brecht and O. Machold. 1990. The chlorophyll proteins of pine Pinus sylvestris as influenced by sulfur dioxide incubation. *Jr. Plant Physiol.* 136: 300-305.
- Schweingruber, F. H. 1986. Abrupt growth changes in conifers. *IAWA Bull.* 7: 277-283.

- Sharma, D. D., H. K. Sharma and G. S. Paliwal. 1979. Size correlations among cambial initials and their derivatives in Polyalthia longifolia Thw. Acta. Soc. Bot. Pol. 48: 93-98.
- Sharma, G. K. 1989. Modifications in Ginkgo biloba L. in response to environmental pollution. Jr. of Tenne. Acad. Sci. 64: 26-28.
- Shortle, W. C. 1983. Effects of acute stress on fir spruce trees vary as growth potential determined electrically. Phytopathol. 73: 1347.
- Shortle, W. C and J. Bauch. 1986. Wood characteristics of Abies balsamea in the New England compared to Abies alba from sites in Europe with decline problems. IAWA Bull. 7: 375-387.
- Shyamal, K. M., J. R. Halma., S. W. Cline., D. Rieker., C. Daehler., R. W. Zelnick., T. Saylor and S. Geist. 1991. Tree ring growth and elemental concentrations in wood cores of Oak species in eastern Pennsylvania. Possible influences of air pollution and acidic deposition. Env. Tech. 12: 41-49.
- Silva, E. A. M., L. A. R. Pereira., A. L. Pinheiro and R. S. Ramalho. 1990. Seasonal variation in cambial activity of three forest species growing at Viscosa Minas Gerais. Seiva. 50: 49-52.
- Smith, K. T., R. O. Blanchard and W. C. Shortle. 1984. Cambial electrical resistance related to the number of vascular cambial cells in balsam fir. Can. J. For. Res. 14: 950-952.
- Sudachkova, N. E., I. C. Milytina., N. N. Kozhevnikova and G. P. Semenova. 1993. Environmental stress effect on carbohydrate content in Scots pine tissues. XV. International Botanical Congress Japan. Poster presentation.
- Sundberg, B., C. H. A. Little and K. Cui. 1990. Distribution of IAA and the occurrence of its alkali labile conjugates in the extraxylary region of Pinus sylvestris stems. Plant Physiology 93: 1295-1302.
- Sundberg, B., C. H. A. Little., R. T. Riding and A. Sandberg. 1987. Levels of endogenous IAA in the vascular cambium of Abies balsamea trees during the activity-rest-quiescence transition. Physiol. Plant. 71: 163-170.
- Sundberg, B., C. H. A. Little., K. Cui and G. Sandberg. 1991. Levels of endogenous IAA in the stem of Pinus sylvestris in relation to the seasonal variation of cambial activity. Plant Cell and Environment 14: 241-246.
- Suwannapinunt, W. and T. T. Kozlowski. 1979. Effect of sulfur dioxide on transpiration, chlorophyll content growth and

- injury in young seedlings of woody angiosperms. Can. J. For. Res. 10: 78 -81.
- Thompson, M. A. 1981. Tree rings and air pollution. A case study of Pinus monophylla growing in the east central Nevada. Envir. Pollut. 26: 251-266.
- Thornton, F. C., P. A. Pier and Mc Duffie Jr. 1990. Response of growth, photosynthesis and mineral nutrition of red spruce seedlings to ozone and acidic cloud deposition. Environmental and Experimental Botany 30: 313-323.
- Torelli, N., B. Krizaj., P. Oven., M. Zupancic and K. Cufar. 1992. Bioelectrical resistance and its seasonal variations as the indicator of tree condition as illustrated by silver fir (Abies alba. Mill). Holz-Als-Roh Und Werkstoff. 50: 180.
- Tsuda, M. and Shimaji. 1971. Seasonal changes of cambial activity and starch content in Pinus densiflora. Sieb. et. Zucc. J. Jap. For. Soc. 53: 103-107.
- Venugopal, N. and K. V. Krishnamurthy. 1987a. Seasonal production of secondary phloem in the twigs of certain tropical timber trees. Ann. Bot. 60: 61-67.
- and----- . 1987b. Seasonal production of secondary xylem in the twigs of certain tropical trees. IAWA Bull. 8: 31-39.
- Venugopal, N. and K. V. Krishnamurthy. 1989. Organization of vascular cambium during different seasons in some tropical timber trees. Nord. J. Bot. 8: 631-638.
- Vijayan, R. 1987. Effect of industrial air pollution on some fruit trees. Ph.D. Thesis. M. S. University of Baroda, Baroda.
- Visser, H. and J. Molenaar. 1992. Estimating trends and stochastic response functions in dendrology with an application to fir decline. For. Sci. Bethesda. 38: 221-234.
- Waisel, Y. and A. Fahn. 1965. The effect of environment on wood formation and cambial activity in Robinia pseudoacacia. New Phytol. 64: 436-442.
- Waisel, Y., N. Liphschitz and A. Fahn. 1970. Cambial activity in Zygophyllum dumosum. Ann. Bot. 34: 409-414.
- Wareing, P. F. 1951. Growth studies in woody species. The initiation of cambial activity in ring porous species. Physiol. Plant. 4: 546-562.
- Wareing, P. F. and I. D. J. Phillips. 1978. The Control of Growth and Differentiation in Plants. Pergamon Press. Oxford.

- Wiebe, S. and H. Blaschke. 1988. Relations between crown damage and root starch content in Fagus sylvatica L. Eur. J. For. Pathology. 18: 421-425.
- Wilcox, H. 1962. Cambial Growth Characteristics. In: Kozlowski, T.T. (ed.) Tree Growth. Ronald Press, New York. pp. 57-88.
- Yokobori, M. 1986. Xylochronological observation on difference in pine growth between sheltered and non sheltered forests in air polluted area. Proc. 18th IUFRO World Congress. Division-2: 381-388.
- Yoshitake, T. and H. Masuda. 1986. Study on unusual defoliation of Pinus strobus etc., in a region of Tamakomai. Bull. For. and For. Products. Res. Insti. 337: 1-28.
- Zach, J. and K. Drapela. 1991. A diameter increment analysis of Spruce in the Seskydy mountains in the area under the influence of air pollutants. Lesnictvi (CSFR) 37: 787-794.