

THE EFFECTS OF MICROWAVES ON THE TREES AND OTHER PLANTS

© Alfonso Balmori Martínez. Biologist.
Valladolid. Spain.
December, 2003

Plants and electromagnetic fields

In several germination rehearsals realized in laboratory subjecting the seeds to a static magnetic field, it has been proven a increase in the speed and in the number of germinations. In experiments of growth, it has been proven that the exposed plants develops bigger longitude and weight (Martínez *et al.*, 2003). In a study realized under a high tension line between Austria and the Czech Republic, its effect on wheat and corn cultivations was evaluated. The results indicated a reduction in the production of wheat of 7% in the next fields to the electric line during the 5 years that the investigation lasted (Soya *et al.*, 2003). It is usually corroborated a stimulating effect on the growth and development of plants subjected to static magnetic fields, but inhibitory action in the case of variable magnetic fields (Martínez *et al.*, 2003).

Effects in the balance of calcium in meristem cells of the pea roots subjected to magnetic fields were observed (Belyavskaya, 2001). Another study realized with microwaves also checked a long term descent in the levels of calcium and sulfur in the leaves of beech tree directly related with the power of the broadcast radiation (Schmutz *et al.*, 1996). In animal cells has been proven the same thing, the microwaves can affect the intercellular communication and that can affect the functioning to the calcium channels (Dutta *et al.*, 1989).

30 years ago two Canadian Investigators observed a deterioration that was unpredictable on the plants subjected to microwaves (Tanner & Romero-Sierra, 1974). More recently other authors have notified cytogenetical changes (micronuclei, interchromosomal bridges and chromosomal fragments) induced in wheat exposed to a source of microwaves. They conclude that those effects are not thermal (Pavel *et al.*, 1998). An Ukrainian investigator has also observed alterations in condensed chromatin distribution of meristem cells exposed to low magnetic fields (Belyavskaya, 2001).

And that will pass with the trees?

In the area that received the radiation of Skruna Radio Location Station (Latvia), the radial growth of pine trees (*Pinus sylvestris*) decreased. This didn't happen beyond the area of incidence of the electromagnetic waves. A negative correlation statistically significant was also proven between the relative additional increment of the trees and the intensity of the electromagnetic field, and was confirmed that the beginning of this decrease in growth coincided with the start of operation of the radar. The effects of many other environmental and anthropogenic factors were evaluated, but

no significant effects on the tree growth were observed (Balodis *et al.*, 1996). In a study, carried out at the same time, on the cellular ultrastructure of the needles of the irradiated pines, was observed an acceleration of the production of resin, a promotion of the senescence of the trees and a falling germination of the seeds from the most exposed pines to the electromagnetic fields (Selga & Selga, 1996).

The near trees to a antenna located in a forest of Michigan have grown very quickly since the mast was installed in 1986. Forestry researchers attribute the extra growth to the electromagnetic fields around the antenna. It seems that each species react in a different way: They don't seem affect to the northern red oaks (*Quercus rubra*) and neither to the paper birches (*Betula papyrifera*), but red pines near the antenna grew taller than red pines at the distant site, while aspen (*Populus tremuloides*) and red maples (*Acer rubrum*) grew thicker than their counterparts further off (Kiernan, 1995). These observations suggest that the electromagnetic fields have a subtle influence in the forest.

In Ouruhia (New Zealand), the trees have been dying where the main beams are directed to, in places that received the waves of a potent radio antenna. They seem to be most vulnerable when they had their roots in water or they were near the river. In the points with higher levels of electromagnetic radiation the trees were affected or they were dead (<http://canterbury.cyberplace.org.nz/ouruhia/>).

In the frontier along the former border between the FRG and the GDR, numerous radars were placed for espionage mission during the cold war. The areas with the damaged forest almost always coincided with the surface swept by the microwaves. Immediately after the spying installations, that were working during 2 or 3 decades, have been powered down, a notorious recovery of the forest took place. In those areas conventional contamination didn't exist. In Canada the radars also had devastating effects in the near forests (Volkrodt, 1991).

In Switzerland the trees located near a great transmitter grew in such a way that it seemed that they escaped from the waves (Hans-U. Jakob., not published data), this curious observation it is also described by the Dr. Hertel (1991).

It is important to point out that the radiations that were investigated in these studies were pulsed microwave radiation, with characteristic very similar to the modern communication systems (telephony without cables).

Possible explanations

The trees are particularly sensitive and react to environmental changes (Balodis, 1996). Some European scientists are convinced that acid rain is not judged the sole cause of the new type of forest damage that has desolated big areas in Germany, Switzerland and Austria, and that there are other additional culprits, among them the electromagnetic fields of microwaves. The humanity knows the electromagnetic waves for one century, but it didn't begin to use massively in technical applications until the second world war. Over the last thirty years, transmission density has doubled every four years, and the electromagnetic contamination has gone up around 100 times. We have now entered the microwave era where we are dealing with minuscules dimensions (Volkrodt, 1988). Our environment are polluted with much waste in the form of dangerous electromagnetic radiations (Volkrodt, 1991). Today trees and other biological systems are being subjected to a dangerous higher microwave radiation, several billion times higher that naturally ordained, that it interfere with the alive systems of information and causes effects, slow but relentless, on the alive matter.

In some regions, that have the clean air, the floor that is under the trees remains acid in spite of the absence of chemical precipitation. Does some other process that can cause changes in the balance of ions exist?. The answer is affirmative, for example the electrolysis. This requires that there exists in the soil an electric current which creates ion movement through the depositing of electrons on water soluble minerals suspended in solution. Wolfgang Volkrodt investigated the damages caused by the radars on the German forests during many years, and he checked that the areas with high microwave levels exhibited serious forest damages. "The microwaves are certainly, one of many harmful factors, but we don't know the extent of its magnitude...they cause the cellular membranes of trees to resonate and thereby interrupt the water circulation. The balance of electrically charged particles is also distorted... The short waves are those that more damages to the trees" (Volkrodt, 1988 & 1991).

It is possible that the microwaves are received by the trees and finally converted in electric current that flows toward the ground. Already in 1987 the renowned forest biologist Professor Hüttermann (1987) made the following statement: "There can be no doubt that electromagnetic waves are received by the trees and their needles. Although they are not optimal conductors, it can be demonstrated by means of simple experiments that the leaves absorb for resonance the waves and that this process causes the induction of a flow of electrically charged particles in the needles and leaves." Continuing with the Volkrodt theory (Volkrodt, 1991) the induced charge carriers finally migrate into the ground and the direct current that spreads from the roots into the soils causes a kind of electrolysis. And this leads to the soil acidification, repeatedly observed under the trees that exhibit this new type of damages. In the ground a change occurs in the ionic balance (acidification). It disturbs the mineral management of the affected trees and also retards the activity of soil organisms. However the comprehensive scientific evaluation would require long term studies since the fragmentary investigation it is insufficient. According to this author, the high compensatory payments to people and forest estates, damaged by the influence of the microwaves, avoided that the investigations continued (Volkrodt, 1991).

According to the Swiss investigator Ulrich Hertel, it perfectly established proof of a causal chain of electrical smog/ stunted growth/ damage to soil/ dying trees. Yet the official science ignores it. "The increasing contamination of our environment with technological poisons, as the radiations, is specially pernicious, it exposes the environment to a constant stream of considerably higher and more dangerous frequency, and these, virtually without pause. The slow process of death has begun... There are always certain trees which, due to their location or because of their constitution, are less exposed to the damaging influences or are able to put up more resistance than others. In the near forests to these radars, the trees that grow on the hills and mountains are condemned, they are generally thinning, lean or have withered tops. The most protected sector has the intact trees still.... The microwaves act slowly on the soil, on plants and on water. Under their influence the structure of all organic components has to disintegrate... Today, all life cycles in nature are being badly damaged by technological radiation. The internal destruction of the soil also interferes with the growth of the young forest. The delicate absorbent hair roots here are missing, the trees are standing in water and yet die of thirst. The destruction of the electrical potential differentiation, both in the water and in the tree, prevents the capillary's ability to pull the water upward in the circulation system from above. For this reason the flow of sap is slowed and gradually it ceases completely. The tree begins to wither, from the top down. The branches lose their needles and become thin. The trees grow transparent, their color also changes.... Natural electromagnetic relationships form the basis of all cycles in nature.

The construction and preservation of these relationships is only possible due to natural energy and their destruction takes place because of energy emanating from the technological unnatural energy” (Hertel, 1991).

Nearer observations in the space and the time

For some years a progressive deterioration on the trees, especially near the phone masts in the cities, it is producing. We don't still have systematized observations, but in Valladolid (Spain) the trees located inside the main lobe (beam), show an aspect sad and feeble, possible delays in the growth and, probably, a high susceptibility to illnesses and plagues. In the places in those that we have measured bigger radiation levels the trees show a more notorious deterioration. The trees don't grow above the height of the other ones and, those that stand out for above, have withered tops. We have observed that the white and black poplars (*Populus sp.*) and the willows (*Salix sp.*) are more sensitive, although we ignore if a special susceptibility of this family exists or it can be due to their ecological characteristics that force them to always live near the water, and this favors the electric conductivity (see also <http://canterbury.cyberplace.org.nz/ouruhia/>). Other species as *Platanus sp.* and *Lygustrum japonicum*, are shown more resistant.

The Necessity of prevention, monitoring and control

15 years ago Wolfgang Volkrodt wrote with ingenousness: “But the future looks brighter. By the year 2100 communications transmissions will be achieved through a national network of modulated fiber optic conductor cables. After that the surfeit of microwave transmitters, in particular directional transmitters, will no longuer be necessary” He wanted fervently that ceases the damage to environment with dangerous electromagnetic radiations of microwaves, at the same time that made a warning on the urgency of abandoning the use of this technology (Volkrodt, 1988). Their forecasts, although very deliberate, was very mistaken. Parallely to the fiber optic the expansion of the communications without cable (GMS, DCS, UMTS, WLAN...) in the last years has been explosive.

In a less innocent way already noticed this author on the powerful interests of the industry and their intents to avoid that was investigated (Volkrodt, 1991). In other occasions the industry financed the studies to avoid its publication (Hans-U. Jakob. unpublished data).

The bibliography revised in this article is disturbing. The logic indicates us that it should have been foreseen the effects before the unfolding...

The electromagnetic fields are altering our world in a way that we don't very still understand. The monitoring of the forest masses requires a special attention. If we consider what we know today, any near installation to forests, parks or gardens, should value the impact of microwaves on the next vegetable masses that, without a doubt, keeping in mind their effects to the health of people (Navarro *et al.*, 2003; Santini *et al.*, 2003) and to the fauna (Balmori, 2003), are much more dangerous of that the industry and the interests created his around, without any scientific guarantee and in a false way proclaim.

REFERENCES

- BELYAVSKAYA, N.A. 2001. Ultrastructure and calcium balance in meristem cells of pea roots exposed to extremely low magnetic fields. *Adv. Space Res.*, 28: 645-650.
- BALMORI, A. 2003. Aves y telefonía móvil. Resultados preliminares de los efectos de las ondas electromagnéticas sobre la fauna urbana. *El ecologista*, 36: 40-42.
- BALODIS, V. G. BRUMELIS, K. KALVISKIS, O. NIKODEMUS, D. TJARVE, V. ZNOTINA. 1996. Does the Skrunda Radio Location Station diminish the radial growth of pine trees? *Sci. Total Environ.*, 180: 57-64.
- DUTTA, S.K., GHOSH, B., BLACKMAN, C.F. 1989. Radiofrequency radiation-induced calcium ion efflux enhancement from human and other neuroblastoma cells in culture. *Bioelectromagnetics*, 10: 197-202.
- HERTEL, U. 1991. The forest dies as politicians look on. *Raum & Zeit*, 51. May-jun, 91. [Translation from the German].
- HÜTTERMANN, A. 1987. On the question of a possible contribution to new types of forest damage by electromagnetic radiation. *Der Forst-u. Holzwirt*, 23. November, 1987. [Translation from the German].
- KIERNAN, V. 1995. "Forest grows tall on radio waves". *New Scientist*, 14 January 1995, p5.
- MARTÍNEZ, E., CARBONELL, M.V., FLÓREZ, M. 2003. Estimulación de la germinación y el crecimiento por exposición a campos magnéticos. *Investigación y Ciencia*, 324: 24-28.
- NAVARRO, E.A., SEGURA, J., PORTOLÉS, M., GÓMEZ PERRETTA, C. 2003. The microwave Syndrome: A preliminary Study in Spain. *Electromagnetic Biology and Medicine*, 22: 161-169.
- PAVEL, A., UNGUREANU, CE., BARA, II., GASSNER, P., CREANGA, DE. 1998. Cytogenetic changes induced by low-intensity microwaves in the species *Triticum aestivum*. *Rev. Med. Chir. Soc. Med. Nat. Iasi.*, 102: 89-92.
- SANTINI, R., P. SANTINI, P. LE RUZ, J. M. DANZE, M. SEIGNE. 2003 a. Survey Study of People Living in the Vicinity of Cellular Phone Base Stations. *Electromagnetic Biology and Medicine*, 22: 41-49
- SCHMUTZ, P., SIEGENTHALER, J., STAEGER, C., TARJAN, D., BUCHER, JB. 1996. Long-term exposure of young spruce and beech trees to 2450-MHz microwave radiation. *Sci. Total Environ.*, 180: 43 – 48.
- SELGA, T. AND SELGA, M. 1996. Response of *Pinus Sylvestris* L. needles to electromagnetic fields. Cytological and ultrastructural aspects. *The Science of the Total Environment*, 180: 65-73.
- SOJA, G., KUNSCH, B., GERZABEK, M., REICHENAUER, T., SOJA, AM., RIPPAR, G., BOLHAR-NORDENKAMPF, HR. 2003. Growth and yield of winter wheat (*Triticum aestivum*) and corn (*Zea mays*) near a high voltage transmission line.
- TANNER, J.A. & ROMERO-SIERRA, C. 1974. Beneficial and harmful growth induced by the action of nonionizing radiation. *Annals of the New York Academy of Sciences*, 238: 171-175.
- VOLKRODT, W. 1988. Electromagnetic pollution of the environment. In Robert Krieps (Ed.): Environment and health: a holistic approach. Luxembourg Ministries of Environment and Health, the Commission of the European Communities and the World Health Organization.
- VOLKRODT, W. 1991. Are Microwaves faced with a Fiasco similar to that experienced by Nuclear Energy? *Wetter-Boden- Mensch* 4/1991 [Translation from the German].