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Short communication

NEW ECOLOGY FOR ERADICATING GHG-NITROUS OXIDE (N_2O)

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[*A new pulse based manoeuvrable ecology was developed, as non monetary input, to bring reductions of nitrous axide, an important green house gas emanating from the primary producers viz agriculture, grasslands and forests*].

Key words: Ecology, GHGs, inter cropping, weed control, land equivalent ratio, pulse crop, nitrogen management

Insurmountable nitrous oxide is third in the order of importance a green house gas (GHG) after carbon dioxide and sulphur dioxide, known to emanate from agriculture and cause depletion of ozone layer in the Antarctica. *Wuebble* (2009) described this nitrous oxide gas, not a mere laughing gas, but to produce far more serious deleterious effect, and no existence of easy eradication method. In the recent years the nitrous cycle has assumed the first importance of causing undesirable effects of overtaking the severity of carbon cycle. This situation of dominance of nitrogen cycle is exemplified by disasters of nitrogen misbalances caused in Ireland. The severity and domain of the misbalances of nitrogen cycle are enumerated by *Howarth* (2000, 2005). The ecosystems and policies formed did not reach to any simple and feasible solution. In his earlier studies *Yadav* (2014, 2015a) presented detailed development of management of nitrogen cycle to create lucrative venture to involve peoples' participation and produce indirect effect on reduction of the nitrous oxide. In this research a simple non monetary input based control measure for eradication of nitrous oxide is presented.

In the study of management of nitrogen cycle it was clear that nitrous oxide is emitted during the process of nitrification and denitrification, and quantum of their emissions depends on the nitrogen reserve at any time in the soil. The leguminous plants fix RNH_3 from atmosphere and enhance N reserve in the soil. Thus, there should be a mechanism to store nitrogen from the atmosphere and simultaneously utilize it for growth and yields of other companion crop/plants. Thus, a rolling cycle of nitrogen building and utilizing during the crops growing period, nitrogen mineralization and immobilization should work year round. The strategy should be to have cropping systems ecology in arable land, permanent grass lands and forests with suitable inter crop in the non arable portion of space in respective ecosystems.

In the new ecology suitable and compatible leguminous crop of any agro eco-region should be intra row and intercrop sown at an optimized seed rate to produce maximum yield of main crop and inter crop, maximum weed control and maximum land equivalent ratio. In the permanent grasslands the maximum yield of forage

should result. The forest tree plantations should have leguminous crop such as sisbania that will grow along the main tree and fix nitrogen to be used by the companion trees. The weeds will get suppressed and emission of nitrous oxides from the grass lands, range lands and forest reduced. The legumes for the rainy season crops are green gram, black gram, sunhemp, pigeon pea, lucaen and sisbania etc. Likewise the leguminous crops for winter can be peas, chick pea, lentil, medicago, alfalfa, even fenugreek and coriander etc. During the summer cropping a leguminous crop such as indigo, which is not grazed by the blue bulls, will be very good choice for building nitrogen. During the intervening period ie land free of arable crop should be sown with any pulse crop to provide surface cover, fix nitrogen till it remains in the field, and eliminate need of ploughing to build mineralization and immobilization of nitrogen in soils, to accumulate nitrogen in the green biomass of standing crop to be inverted in field to carryout timely sowing of the next crop of the season.

In another study [*Yadav*, 2013, 2014, 2015b) a new land formation practice was developed which comprises raised beds and furrows to provide crop diversification for wetland paddy cultivation, which otherwise remain blamed for release of excessive methane (CH_4). The crop diversification of sowing of leguminous suitable crop will bring reduction of nitrous oxide as well. The unavoidable wet land paddy cultivation should be planted with *sisbania*, which grows and fixes nitrogen under both the dry and wet land conditions.

For permanent grass cover a novel food crop teff [*Eragrostis tef*] used for making Inzera in Eritrea and Ethiopia, in both the highland countries in the central East Africa should be sown with bands of suitable legumes to increase harvest biomass [*Yadav and Chaudhary*, 2015]. The crop's small grain can be harvested for food and remaining stalk left in field will provide surface cove and eaten by cattle grazing. The surface cover will work as filter to retain sediment at site and save water bodies from sedimentation.

Thus, these measures in addition to enhancing grain yields and weed controls will reduce emission of nitrous oxide, build residual nitrogen at harvest that will eliminate land degradation due to nutrient deficiency, provide surface cover to avoid splash and wash off erosion losses and provide green biomass for green manuring. Great deal of green manuring viz Liquid green manure (IGM), and NADAPED green manuring can be carried out to provide organic manure.

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