RAMA UNIVERSITY

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FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES

Lecture 5: Penning, sewage, sullage, sludge and poudrette and other bulky organic manures

PENNING

Penning: Keeping the boven animals (cattle and sheep) in the fallow land after the harvest of the last crop, throughout day /and or night provided with suitable food and shelter.

Types of penning: There are two types of penning

I. Cattle penning

II. Sheep penning

I. Cattle penning :

Keeping the cattle in the fallow land after harvest of the last crop, throughout day and night by providing them suitable food and shelter is called cattle penning .It is an ideal practice of collection and storage of dung and urine directly in the field .Urine is absorbed by soil while dung and litter are incorporated in situ . Losses in storage and collection are avoided by penning. Cattle are shifted from one field to other field once in 2-3 days for covering the maximum area . The dung and urine are uniformly spread and ploughed in it. The period congenial for cattle penning varies from 3-6 months i.e., form January –June or March to May depending on the extent of non cropping period.
Cattle penning is largely done for seedbeds of rice, root crops, sugarcane, vegetable etc., which require very heavy manuring. It is one of the oldest practice followed in India .About 800-1000 cattle per acre are penned which would be equivalent to 10-15 tonnes of cattle manure per acre [Composition (%): 0.5 N, 0.25P and 0.5K].

II. Sheep penning :

It is a popular practice followed in drier regions of Andhra Pradesh .Flocks of sheep and goats are penned in the fields during nights and allowed to graze during day time .The flocks are frequently disturbed during nights to increase droppings as they tend to void droppings when disturbed .The sheep penning is generally adopted for cash crops like vegetables, tuber crops, chillies and sugarcane. Penning about 2000 heads per acre is the common practice. Sheep and goat manure are relatively lower in moisture content and higher in nutrient value than cattle manure .Average nutrient composition (%) of sheep and goat manure 1.93 N , 0.6 P and 1.90 K .

Some of the other organic (bulky) manures are obtained from the solid excretions from piggery, poultry and Human excreta (Night soil)

Pig manure: It is collected in dry state stored and extensively used whenever it is available for rice, banana, and vegetables .The percent nutrient composition is 3.7 N,1.4 P and 0.3 K.

Poultry manure: It has been become popular consequent to the rapid growth of poultry industry .It is used for extensive cropping such as rice, sugarcane and chillies .The per cent nutrient composition of poultry manure is 0.9 N,0.8P and 0.5K.

Night soil: Human excrements both of solid and liquid material put together constitute Night soil. It is a rich source of N and P than cattle dung.

S.No.	Nutrient	Human excreta nutrients supply(kg /person /year)	Relative values in terms of cattle dung (kg /cow /year)
1	N	4.7	2.9
2	P2 O5	1.1	0.8
3	K_2 O	1.0	2.3

POUDRETTE

It is the product obtained from night soil without any admixture of other organic waste materials. Night soil is spread in thin layers over which copper sulphate and soil are lightly spread .The mass is periodically racked up and re-spread till dry .It is called poudrette .When it is properly prepared looks like a reddish loamy soil and in dry, powdery and devoid of offensive smell .
Night soil digestion: CPHERI (Central Public Health and Engineering Research Institute), Nagpur is working on night soil digestion, it provides Inoffensive sludge with undiminished fertilizer value, Gas and electricity for rural areas.

Night soil can be digested in a 230 sq .feet (6.5m3) digester without any fly or odour nuisance in an unheated open tank with manual stirring.

Criteria for night soil digester

A. Capacity : 3-6 m3

B.Raw night soil : water : 2:3

C. Gas yield : 3 m3 /100 persons

D. Calorific value : 5558 K.Cal/ m3 gas

Horse power generated for 100 persons : 2.0

Manurial value on dry basis (%): 3-5 N, 2 to 4.4 P_2O_5 and 0.7 to 1.9 K_2O
The sludge in the night soil digester is removed in a week or two .The sludge can be spread on a drying bed of 3-5m^3 /100 persons where it can dry and be removed for use as manure .
The composition of gas (%): 65 CH_4 , 34 CO_2 and 1 others on volume basis. Gas is used for running pump sets and street light lamps. The supernatant liquid from the digester is mixed with garbage and compost and used as manure.
Full scale night soils digester exists in Ernakulam in Kerala state is capable of serving 20,000 people .One of the best village organization viz., Koroda Gram Panchayat in Maharastra has installed for night soil digestion where lavatories were constructed in such a way that night soil can be directly taken to a centrally located digester.

SEWAGE AND SLUDGE

SEWAGE:

Sewage refers to the used up water from towns and cities collected though a drainage system. It consists of solid and liquid excreta and liquid wastes from kitchen and bath rooms. It also contains animal vegetable and mineral matter in suspension, solution and colloidal state .It is the mineral matter that makes the purification difficult.

SEWERAGE: Sewerage is the pipe system that carries the sewage for disposal

SULLAGE: Is the water drained from the kitchens, bathrooms and drainage water of the streets (open canal)
EFFLUENT: It is the clear supernatant liquid obtained after aeration during sedimentation process in the septic tanks of the activated sludge process . It is fit for irrigation and rich in N.

SLUDGE: Sludge is the sediment that settles down in the activated sludge process .It is dark and powdery material with good manurial value.

ACTIVATED SLUDGE PROCESS

The activated sludge process is a type of wastewater treatment process for treating sewage or industrial wastewaters using aeration and a biological floc composed of bacteria and protozoa.

The general arrangement of an activated sludge process for removing carbonaceous pollution includes the following items: An aeration tank where air (or oxygen) is injected in the mixed liquor. This is followed by a settling tank (usually referred to as "final clarifier" or "secondary settling tank") to allow the biological flocs (the sludge blanket) to settle, thus separating the biological sludge from the clear treated water.

Out turn of the sludge is 15 per cent of entire sludge handled. Manurial value is 3.5% N-1.0% P_2O_5 - 0.5 to 1.0 % K_2O

Advantages:

Maintain proper sanitary conditions

Large quantities of manure and water useful for irrigation

Generates good income to the local bodies

Avoids pollution of adjoining water bodies.

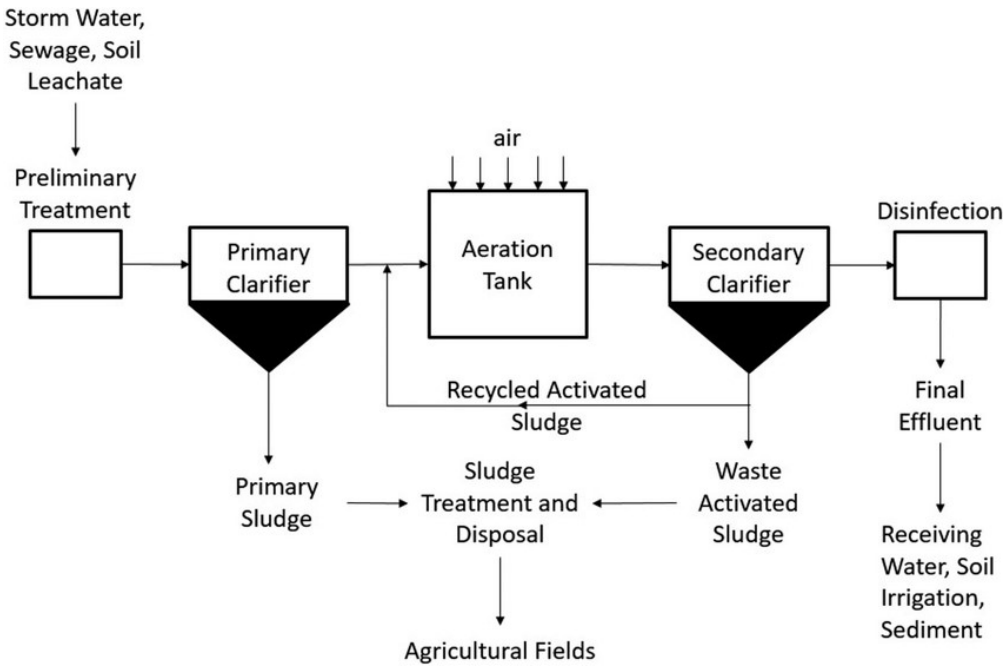

Figure: schematic diagram of activated sludge process