

[Stoves] A.D. Karve's methane digestion device

adkarve [adkarve at pn2.vsnl.net.in](mailto:adkarve@pn2.vsnl.net.in)

Mon Oct 18 00:04:04 EDT 2004

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Dear Stovers,

I was flooded with requests from members for details of the compact biogas

digester. Peter Springfield presented a nice collection of my own postings.

They contain several contradictions and discrepancies. The digester is still

in the prototype stage and we are still working on it. It is thus going

through a process of evolution and it may take some time before we come out

with the ultimate optimal design. The present status is that a family needs

about 500 litres of methane (roughly 130 g by weight) for cooking a meal.

Therefore, the gas holder has to have the capacity to hold about 500 litres

of gas. In a model, having two cylinders telescoping into one another, this

automatically determines the volume of the digester (lower barrel), which

too must have a volume of about 500 litres. We have several firms selling

plastic water tanks. By searching in the market, one can find two 500 litre

tanks having slightly different diameters. The tank with the smaller diameter serves as the gas holder and the one with the larger diameter serves as the fermenter. It is advisable to have black tanks and to keep

them exposed to direct sunlight, as the reaction runs faster with higher temperature. To start the fermenter, one uses about 10 kg cattle dung mixed with water and fills the fermenter tank. It takes about 8 days before the gas accumulation starts. The accumulated gas lifts the gas holder. Test the gas every day for its combustibility. If it is not combustible, just let it escape. Once you start getting combustible gas, start feeding the fermenter with the high starch/sugar feedstock. Feed about 1 kg equivalent of sugar or starch in the morning and again 1kg equivalent in the evening. We have so far successfully used flour of cereal grains, flour of a whole lot of seeds collected from various tree species, leftover food, sugarcane juice, macerated whole sugarcane, oilcakes of edible as well non-edible oilseeds, pulp of papaya, bananas, mangoes, rotten onions, macerated tubers of potato, tapioka, sweet potato, taro etc. The conventional biogas plants use feedstock having high organic carbon content but low calorific value. It is a universal rule that every output of work requires a corresponding input of energy. In the conventional biogas plants, the conventional feedstock is low in physiologically available calories. So naturally the gas output is also low. The stovers understand calories. When talking with stovers about fuel, the first question that is asked is about the calorific value of the fuel. But apparently the biogas workers do not understand calories. They talk of C/N ratio, organic matter that can be volatilized and many other things, which make no sense to me. Now that we are on the way to getting a grant from USEPA, we want to scale

up the manufacture of the present model with the help of a plastic manufacturer. It is our aspiration that the model, having a gas holder of 500 litre capacity should not cost more than about US\$50. The gas stove with two burners costs US\$20. The total expenditure is about the same as the present price of an LPG system, which includes the deposit for the LPG cylinder. Anybody who has already installed a conventional biogas system in his house, has only to switch from dung to the new feedstock. Many people have already done it.

Yours

A.D.Karve

----- Original Message -----

From: Peter Singfield <[snkm at btl.net](mailto:snkm@btl.net)>

To: <[STOVES at listserv.repp.org](mailto:STOVES@listserv.repp.org)>; <[gasification at listserv.repp.org](mailto:gasification@listserv.repp.org)>

Sent: Monday, October 18, 2004 12:24 AM

Subject: [Stoves] Reviewing A.D. Karve's methane digestion device

>

> *****

> *If we can get A. D. to enter into discussion -- some questions need be asked.*

>

> *1: Will fresh cane juice be a good "food" for your digester?*

>

> *****

>

> *Further investigations of my extensive archives on hard drive have derived*

> *A.D.'s answer to this question -- above -- addressed to me personally on*

> *this same mail list -- and some time back!*

>

> *So embarrassing to age and lose my mental capacities --*

>

> *Here is that answer:*

>

> *Date: Wed, 07 Jan 2004 19:27:25 +0530*

> From: "A.D. Karve" <[adkarve at pn2.vsnl.net.in](mailto:adkarve@pn2.vsnl.net.in)>
> Subject: Re: [STOVES] compact biogas plant
> To: Peter Singfield <[snkm at btl.net](mailto:snkm@btl.net)>, [STOVES at LISTSERV.REPP.ORG](mailto:STOVES@LISTSERV.REPP.ORG)
> X-Accept-Language: en-us
>
> Dear Peter,
>
> Our biogas plant accepts both sugarcane juice as also macerated
whole
> sugarcane.
>
> In the case of the latter, the advantage is that the cellulose in
the cane
> is also converted into gas, albeit after a retention period of
about 20
> days.
>
> The maceration is done with the help of a machine called the chaff
cutter,
> which is used for chopping stems of sorghum or maize into small
pieces.
One
> can set the machine to give different sizes of the chopped up
material.
>
> We use the setting for the smallest pieces. Under Indian
conditions,
where
> we get rains only during the four months of monsoon, sugarcane needs
> irrigation.
>
> Therefore it is not such a simple crop to grow and it is also
costly.
There
> are many crops that produce starchy material (e.g. sorghum, pearl
millet,
> sweet potato and several perennial tree species). Many of them can
be
grown
> purely under rainfed situations, and therefore starchy material is
> generally cheaper.
>
> It can also be stored more easily than sugarcane juice or sirup.

>
> I have not patented my biogas plant as I use the same standard
design. The
> fact that one can get methane from starch or sugar is also not my
> invention.
>
> This is common information to everybody in the biogas game. Many
people
> have reported high biogas yields with oilcakes. There was however a
general
> tendency among all workers to use only waste material such as
animal dung,
> municipal solid waste, distillery effluent etc. as the raw material
for
> making methane.
>
> All that I did was to conduct some experiments with starchy and
sugary
> material. When I got good results, I started to search for such
material
> that could be used as feedstock without competing with human or
animal
> food, and found that farmers generally have a lot of starchy and
sugary
> material, which they considered as waste. One can of course have
commercial
> methane production using commercially grown starchy material such as
> sorghum or tapioka. The farmer does not care for what his produce
is
being
> used for, after he has sold it.
>
> In fact none of our technologies is patented, as we want them to
reach the
> people who are need of them.
>
> As to diversifying our operation to other areas, would certainly
like to
> do it, if the money is made available for it.
>
> Yours
> A.D.Karve
>

> *****in reply to*****

>
> Peter Singfield wrote:

> At 05:58 AM 1/5/2004 +0530, A.D. Karve wrote:

> Several members asked me to provide more details about the compact

> biogas plant being developed by us. I give below the latest status of

> this technology.

>
> Dear A.D.Karve;

>
> I live in Belize, Central America, in a small village "Xaibe" -- that is

> literally surrounded in cane fields.

>
> I wonder if an optimized version of your design could be made to operate on

> only fresh cane juice??

>
> Have you tried this as of yet??

>
> For the other stovers on the list -- sugar cane is a wonderfully productive

> plant for any place in the tropics. Very easy to grow. For a large percentage of the world's poorest populations it is feasible to have a

> small plot of cane. This certainly would solve the "where do we find all

> the biomass to burn" problem!

>
> Certainly -- it would be of interest to me to pursue this topic further.

>
> Mr. A.D.Karve -- it is commercially impossible to ship such devices around

> the globe. But have you considered diversifying your operation to other areas??

>
> "Franchising" this gas producer -- based specifically on cane juice --

> would be in teresting and profitable.
>
> One small cane crusher in each village would suffice for everyone's
gas
> generator.
>
> Though this is about gas -- and is about small stoves -- there may
be a
few
> on this list adverse to such a discussion being as it deals not
with --
> what to date -- is considered as standard "stove".
>
> But then -- locking oneself into a rigid mind set is often counter
> productive to innovation or eventual application.
>
> By coincidence I happen to have that "one small cane crusher" --
>
> Peter Singfield
> Belize
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> Stoves mailing list
> [Stoves at listserv.repp.org](http://listserv.repp.org)
> <http://listserv.repp.org/mailman/listinfo/stoves>

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