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Dated.

Utilisation of Coffee Pulp.
For Finca Peubla Project.

Ken Calvert.

Theresa, Hi!

There are Four things one can easily do with coffee pulp on the small scale. In rough order of profitability they are;
A/. Make Ruminant Animal Feedstuff; B/. Grow Mushrooms; C/. Make Compost and liquid fertilizer. D/. Make Biogas. However, the recent escalation of petroleum fuel prices and grain based animal feedstuffs, may well readjust these present pricing structures.

Animal Feedstuff:

Most large scale fruit processing industries have methods of preserving their wastes in some way as animal feedstuff. Factories in S.E.Asia convert their pineapple peelings and cores into silage for cattle feedlots. Some small factories specialize in supplying ultra small packs for feeding individual village animals. The ubiquitous Supermarket plastic shopping bag is rammed full of fruit wastes tied up tight and then rammed with other such bags into the just as ubiquitous white woven poly sack, with a thin airtight plastic liner inside. These sacks of silage can then be later sold in local village markets. The villager can then take out one shopping bag each day, holding about 2kgs, to feed his animal. If he immediately closes up the main sack he can keep the remaining shopping bags still preserved in an anaerobic condition. Much the same can happen on both the small and large scale, with citrus and other fruit wastes. Another option is to dry the material and preserve it in that way. Dried feedstuff is a lot easier and cheaper to transport. However, for several reasons, coffee wastes drying is not a viable option. Mainly because during the coffee season, every available drier is

busy handling the much higher value coffee beans, and the pulp wastes have to be left until the off season for final processing.

Why Not Coffee?

Despite one 1000 years of coffee industry, up until 12 years ago the only answer to the question about feeding of animals was always “No!” No more than 10-15% of an animals diet. Coffee pulp has too much caffeine which makes animals hyper active and they won’t sleep or put on weight.¹ And, there are also too many antinutritionals, tannins, terpenes, terpinoids and other polyphenolic chemicals which lock up proteins and enzymes and subtract from the actual food value of the pulp. The locking up of proteins is what makes ones mouth pucker when trying to eat unripe fruit, especially Persimmons. Tannins lock up the saliva proteins in the mouth, it is not a nice feeling and animals don’t like it either. And those same locked up proteins are no longer available to the animals digestive system. I think that it is an evolutionary mechanism to make sure that seeds/fruits are not wasted by being eaten before they are ripe/ready to germinate and grow. Unfortunately, just drying the pulp tends to intensify these problems rather than remove them. Therefore it was always said, “Coffee pulp is no good as an animal feedstuff!” This was despite the fact that it is well known that fermentation with mushroom like fungi can digest similar polyphenolic antinutritionals and enhance protein levels from straw and many other low grade feedstuffs.

On the opposite side of the debate, there is the positive neutraceutical health values’ to be found in small amounts of coffee pulp in the diet.² It is not presently known whether these are enhanced or reduced in the silage fermentation process.

Many papers have been written, even in the last 5 years, saying that they have tried this microbial approach with coffee wastes, and it doesn’t work! However, all of those particular authors have made two vital mistakes! They have always added nitrogen in some form or other, in order to encourage a good vigorous growth of Fungi, and they have always been in too much of a hurry, probably due to the shortness of the academic year. For budding research students, everything in their practical projects usually has to be wound up in three months.

The Right Answer!

The one group who have seen around these problems, 12-15 years ago, was the group led by Clifford and Adams from Reading and Surrey in the U.K.^{3 4}

¹ Bressani R, Braham J, 1980
Utilization of Coffee Pulp as animal feed.
ASIC No 9. London. 303-323. (Also IDRC publication.)

² <http://www.coffee.20m.com/MillennialMistake.htm>

³ Adams M, Dougan J, 1981.
Biological Management of Coffee Processing Wastes.
Tropical Science 23, 177-197.

⁴ Clifford M, de Colmenares N.G., Ramirez-Martinez J.R., Adams M.R., de Menezes H.C., Tannins in the Sun-Dried Pulp From the Wet-Processing of Arabica Coffee Beans.
ASIC. 14th Coll. 1989.

The part of their work which gives the answers to this problem was published by Hilary de Menezes, now back in Brazil, in two papers delivered to the ASIC conferences in 1993 and 1995.⁵ In essence, what she said was that microorganisms will always take the easy way out. If you add a nitrogen supplement, then the bacteria will use that readily available supply for their growth, and won't bother with anything else. To make those organisms go to the real effort of digesting alkaloids and polyphenolics, in order to get their nitrogen supply, you have to deliberately starve them into it, and even then one must give them lots of time to break down all the 'nasties' that one wants removed.

The best way to do that is to make silage. See also Baier⁶ So, the answer is, no addition of nitrogenous fertilizer, and wait at least 4, or better still 6 months to let them get really hungry.

What she also discovered was that the major family of bacteria used for making ensilage or silage, the Lactobacillus family, is one of the best groups for digesting both caffeine and the 'antinutritionals'. This means that usually there is no need to inoculate the pulp with anything. All the required organisms are already there in the field, on the sticky surface of the picked cherries, waiting to get to work. And sufficient nutrients are there, within the cherries. Nevertheless, in order to get them working quickly and swamp out other possible contenders, either add some sugar in the form of molasses, or, better still, do not pulp the coffee with water because that will leach out its own sugars. This is where the new 'ecological' pulpers come to the fore.⁷

Such an approach generally fits in very well with the coffee processing year. Make bulk silage from your pulp when you are busy with the coffee, (See Coffee Pulp below) and then reprocess the pulp silage during the off season, for an extended cash flow all year round. Do note however that there are a couple of extra tricks involved, if you wish to repack from bulk One of those tricks involves 'The Fungal G Process', where the excess acid initially used to preserve the silage can be further processed into Single Cell Protein, and the protein enriched pulp dried into a meal that is less than half the weight of the original silage and does not need plastic liners in the FIBCs.

The present boom into alternative greenhouse fuels has escalated the price of animal feed grains to the point where cattle feedlot owners are increasingly desperate for any suitable feedstuff that cannot be fermented to ethanol fuel. So, now has to be the time to get a contract to develop the potential of coffee wastes into bulk feedlot feedstuffs. And, the closer that one is to the USA, the more profitable it will be! Mexico, just across the border, would be ideal! . (I think that I have already asked you to try and get a check on local cattle industry in the area) The way to work pulp silage in bulk would be to pack it

⁵ H.C.de Menezes, F. S. Samaan, M. N. Clifford , M. R. Adams.
The fermentation of fresh coffee pulp for use in animal feed.
ASIC 15th. Coll. 1993
H.C. de Menezes, L.R.Romeiro
The Incorporation of Coffee Pulp in Animal Feed.
Reduction of Growth Impairment by Fermentation.
ASIC 16th. Coll. 1995.

⁶ <http://www.mynetworks.org/tcb/page.php?id=1349#1350> (Click to open up first topic)

⁷ <http://www.penagos.com/english/productos/benefi/benefici.htm>

in 1 tonne FIBCs. (Flexible Industrial Bulk Containers.) You pick them up with a tractor and front end loader, suspend them over the feed troughs and pull the trip rope for them to spew out their contents.

Growing Mushrooms:

A mix of coffee hulls and pulp, or better still coffee husk alone, which is the result of dry rather than wet processing coffee, is an excellent substrate for growing many different species of tropical mushrooms which normally grow on wood. (Hulls are what you call the clean white parchment fragments that come from hulling wet processed coffee. Husk is when the coffee cherries are dried, usually in the sun in Brazil, and the cherry pulp dries into a brown rough skin over the parchment layer and everything is removed in the hulling operation together.) The Japanese shiitake mushroom for instance, which takes up to two years to grow in the traditional way on oak logs, can mature in 8-10 weeks if grown on coffee husk or sawdust. (Its all to do with the speed at which the hyphae can spread throughout the soft mix as against burrowing into solid hardwood.) (In addition, I think that some of the pulp nasties need to be eliminated, this time by oxidising the pulp, that is, letting it go black in the open air. That's why Husk is better than hulls.) The best stuff to make mushroom growing material is the blackened waste pulp which is on the surface and edges of a row of Pulp silage. Nothing needs to be wasted.

Once again the only materials required for experimentation, in addition to supplies of spawn for seeding, are the ubiquitous plastic supermarket shopping bags, and a couple of large cookers made of split oil drums. Pleurotus species or oyster mushrooms in all their variations, also Shiitake, Ganoderma, Enoki Lin Chi and Flammulina species can all be grown on several scales of magnitude. One does not even need a special place to house them. Pasteurize the substrate mix in hot water, squeeze out the excess moisture and fill the shopping bags, adding a few grains of spawn to each, and tie them up tight with the handle loops. Place all the bags tightly together in a light tight carton. After the time required to allow the mycelium to spread throughout the substrate, 10-14 days, bring out the bags, hang them in the shade under a tree, slit the bags in several places and water each day. Then in another few days, Voila! Mushrooms! The initial problem for the large grower is marketing. At the beginning, one can probably grow a lot more mushrooms than one can sell. However the small grower can slowly increase his production and choose which species he plans to concentrate on in response to the local market. Mushrooms have a very short life and synchronizing the picking to co-inside with the local market day takes some practice. Lucky is the person who lives close to a centre with a market 7 days a week. It also takes a really strong pair of hands to get the moisture content down to optimum. A small simple lever press makes the job a lot easier.

For a large scale operation in say a 100Ha or larger plantation, the high value mushrooms can be lyophilized or 'freeze dried'. They then become a highly priced, non deteriorating, easy air freight exportable commodity, greatly desired by Asian countries as a health promoting foodstuff. The price for freeze dried Shiitake mushroom in Papua

New Guinea in the 90s was \$26/kg. However, the cost of a freeze drier is considerable, even with the small scale commercial models, at \$20-30,000.⁸

Compost:

Coffee pulp will make good compost. By periodically turning over pulp wastes and re-aerating them once the temperature has dropped after each fermentation cycle, a mix of straight pulp, or pulp and finely milled hulls will break down very quickly. However, it can be made much quicker again if a small amount of nitrogen fertilizer is added to the wet mix. 0.005% of Sulfate of ammonia or urea (or 1-2% of the dry weight,) as a concentrated solution in a fine mist sprayed into the wet pulp as it is being turned over after the first heat cycle, will enable complete composting in 7-10 days. The heap will heat up to 50oC or more, the pectin (mucilage) based pulp structure will collapse and a thick dark liquid is released. This liquid, highly polluting 'en masse', can be sold as a concentrated biolytic liquid fertilizer, if there is a suitable market. The solids, now reduced to one sixth of the weight and volume of the original pulp, have no smell and do not attract flies etc. They can then be side rowed under shelter, and in several weeks they will dry into a beautifully crumb structured earthy smelling powder, identical in appearance to the dry material resulting from vermicomposting.

Composting with worms:

Indeed, composting coffee pulp with worms rather than fertilizer chemicals is a further option if there is a local market for an 'organic' organic soil additive. However, for a non organic operation, there is a lot more work and equipment needed, and the prices achieved in a rural situation do not usually match the time and effort required. Because compost made with worms is identical in appearance to the fertilizer additive type, which is processed in a quarter of the time, all the benefits of a vermin compost, ie. the unique microbiology of a worms gut, can be still provided by running a small worm operation and mixing the end product back in to the main production line. 20% vermiculture and 80% natural compost will give an identical result for a lot less work.

Because worms work slowly and steadily all year round, the most efficient operation is to work them in conjunction with a year round coffee pulp solids biogas plant. The biogas digester will take out all the acid, which worms don't like anyway, and then the solids ejected from the digester can be allowed to drain and then fed to the worms on a slow and steady basis. In that way the value of the preserved pulp is maximized and there is no wastage at all.

If there is no worms operation, then the solid wastes from a pulp to biogas operation, and the crust of oxidized pectins from the acid waste pond, can also be mixed in with ordinary pulp to make compost/soil improver. However, reconsolidating wet pulp from a biogas operation, by itself, in order to make a reasonably solid compost, is not a cheap and easy task and it produces another batch of dirty water which has to be treated differently again, or blended in with much larger quantities of acid factory water to reduce its COD levels and all the black colour chemicals from the cherry skins..

Biogas:

⁸ <http://www.cuddon.co.nz/FD0610.html>

Coffee Pulp can be made into biogas in a normal solids type digester.⁹ However, as stated already, it takes 10-20 days, it does nothing to clean up the major part of the coffee pollution problem which is in the dirty water, indeed it only adds more dirty water to the problem. Unless a segment of costs can be written off against pollution, or maybe GHG & CERs, all biogas, from pulp or water, is not really profitable in its own right. (Q.V. Close down of Costa Rica operations) The only advantage is that using coffee solids, it is possible to preserve them as silage, just as for feedstuff, and have a source of biogas for domestic or small industry purposes all the year round, whereas with a UASB wastewater operation it is confined to the 4-5 months of the harvesting season. It is possible, within two-three days, to wind gas production up or down by adjusting the feed rate to a solids digester. However, it is a lot quicker and easier to manipulate the feedrate of a UASB/EGSB biogas operation cleaning up the dirty water. Coffee waste water not only produces larger quantities of biogas within a much shorter time, 24hours, but also matches the production peaks and troughs much more accurately, on a daily basis, albeit only for the time that the ripe cherry is coming in, less than 4 months of the year. That however is no great disadvantage.

A particularly Meso-american point of difference, is that factories in this area tend to initially treat their wastewater with slaked lime. Although it is expensive, this treatment very quickly precipitates out the soluble pectin fragments and allows them to be collected in a small labyrinth type solids collector before they leave the factory. The problem here is that much of the ultimate sugar content of the waste water, which is crosslinked to the pectins, mainly as polygalacturonides is lost to the wastewater biogas making process. It may perhaps be recovered from a pulp solids biogas operation, but I would suspect that it may be lost for ever?

A second point is that those same pectins have a lot of methoxyl attachments. You can have high and low methoxy pectins and coffee mucilage is high! Ethyl alcohol made from coffee pulp has a lot of methyl alcohol in it which is poisonous, and that is not a good idea. I would guess that those methyl radicals would emerge as additional methane if the mucilage is allowed to break down as much as possible. Locking them up cross linking with calcium ions at the beginning rather than the end of the fermentation process will lose them to the final methane content of the biogas.

Allowing normal fermentation processes to proceed, right through to the “acidogenesis” stage before raising the pH will take out the majority of biogas from the waste water fraction, a much easier task than getting it from the pulp solids. See other papers for ecological cleanup of coffee factory waste waters.¹⁰

The best way to use coffee pulp and other waste solids is to preserve it in bulk during the busy time of the coffee season, and then use the preserved pulp at a slow steady state all through the whole year in a continuous operation to provide motor vehicle fuel, electricity, heating and cooking for the factory staff.¹¹ The present steady escalation

⁹ <http://www.coffee.20m.com/MAFBGGuasb2.htm%22>

¹⁰ <http://www.coffee.20m.com/The%20Renertech%20Biogas%20Process.htm>

¹¹ www.sei.ie/uploadedfiles/RenewableEnergy/BIOGASConsultantscontractors.doc -

in the price of petroleum based fuels should make the conversion of raw biogas into CNG and natural gas for dual fueling the company's tractors, trucks and cars a very viable alternative. In brief, all the possible energy applications relating to 'Natural Gas' are possible with a commercial coffee biogas plant.

Bulk Preservation of Coffee Pulp Solids:

To pretreat the pulp is to make silage from it in long windrows and preserve it in its own acid, exactly as for animal feedstuff. Start by windrowing the fresh squeezed pulp in a heap about 1.2 metres high, 3 metres wide, and as long as the roll of plastic film used to cover it. That size of windrow results from dumping from a tipper truck. Just as quickly as the heap is extended, the pulp should be covered up and made air tight by unrolling a 4 metre wide (centrefolded) roll of blue coffee drying plastic film along the heap and sealing it down as along the edges fast as possible. The edges of the windrow may still decay and go brown/black, (Good for mushrooms) but there should be a solid core of bright pink sticky 'sourkrat' or acid preserved pulp in the middle, which will not release any sticky liquids and will stay preserved for years.

After the picking and processing season is finished, the 100 metre long windrows of preserved coffee pulp can be processed, on a daily basis, by winding the blue plastic sheet or 'tarpaulin' back onto a 4 metre wide wooden pole to expose a section of the heap. The spoiled pulp at the edges can be composted into soil improver, and the bright pink material which will go brown the moment that the air gets to it can be quickly rammed into sacks and FIBCs and sold as ensiled animal feedstuff, when the pulp regains its pink color, or else fed into a solids type biogas digester. By altering the feed rate into the digester, gas production can be wound up or down to meet the daily requirements for energy, in what ever form is required.

Some Biogas Chemistry:

Both the solids and the waste water from coffee production have within themselves all the nutrients required to grow the microorganisms necessary to produce good biogas. Apart from raw limestone or coarse marble chips, for acid neutralization, no other chemicals are required.¹² Do note however that this reference (Houbroun et al) can only recover 23% of the pulp COD. They are obviously unaware of the mucilage problem. Also Urs Baier, "Vergarung von Pulpa der Kaffeeproduktion", has got his wires crossed at the bottom of the first page. He is obviously not a coffee man. The best result one could hope for is about 105,000 tonnes of green bean from 600,000 tonnes of raw berries. (Check the Puebla figures. 9,800 tonnes of cherry to 1,600 tonnes of green bean.) The 125,000 tonnes he mentions might relate to parchment coffee, but certainly not green bean. Nor do his other figures ring true to the ear. (Is your present work part of the 2004 plan that he mentions to set up a pilot plant in Central America??) The good bit about Baiers work is that he agrees that pulp is best preserved under lactic acid as silage until it can be used in a biogas reactor.

¹² <http://www.cababstractsplus.org/google/abstract.asp?AcNo=20033202459>

The overall biogas process occurs in 4 stages with 4 different types of bacteria.¹³ 'Hydrolysis', breaks down the pulp polymers into oligosaccharides, that's short chains of sugar molecules. 'Acidogenesis' converts the molecules into 'short chain' volatile fatty acids. 'Acetogenesis' converts the higher level fatty acids down into the simplest one, acetic acid, and then 'Methanogenic bacteria' can convert the acetates and the hydrogen into methane.

The first two operations occur either in the acid pond, if its liquids, or in the making of silage for solids, and the pulp is preserved in the acid that it makes for itself.

So, ensiled coffee pulp is half way on the way to becoming biogas, and the slowest of these 4 processes, the hydrolysis, has ample time to work to its conclusion whilst in the silage. However, the overall acidity has to be carefully controlled in the methane digester, because the actual biogas making bacteria will not work at a pH of less than 6. So, each daily increment of acid preserved pulp has to be very well mixed in with the digester contents to make sure that the acidity is well spread out and neutralized in the vicinity of the methanogenic (biogas) bacteria. The problem can also be helped by mixing in enough slaked lime with the pulp slurry in the mixing tank to bring the pH up to neutral, just before it is all pumped into the digester. This however demands tight control and frequent testing of the water. If calcium hydroxide (slaked lime) is not easily available, it is easier to use ground raw limestone, as in wastewater treatment, in the premixing tank while the pump is running. This will get circulated during the mixing process, but any surplus must be allowed to settle to the bottom of the tank before pumping the slurry into the digester. Otherwise the lime particles will slowly clog up the base of the digester.

It should also be pointed out that scvfa's from coffee waste water are an excellent substrate for the production of SCP, Single Cell Protein, and other biological materials.

More background on Biogas from coffee pulp.

The last big attempt to make biogas was in Costa Rica in the 1990s. Your Colleague, Alois Grosse-Rueschkamp agr.hh@t-online.de who did the carbon credits (CERs) study for EDE has the best collection on that documentation. It worked, but after the early 80s oil shock had passed, I suspect that the Government went soft on pollution and backed away from their threats to prosecute all the polluters, then, with this threat removed, it just wasn't economic any more and has all closed down. However, the Frans Feil report on this work would indicate to me that this is by far the most successful commercial biogas project within the coffee industry so far. And there is very little, apart from their horrendous capital expenditure, to find fault with in their plant and processes. Technically they sound like a good system. I would suggest that you should get yourself out to Costa Rica and examine those 8 big biogas plants ASAP.

[Can I come and carry your bags? :-<]

I am sure that they could now be built for less than half that cost?

However, apart from the economics, which may soon become positive again, as we head into petroleum shortages, there are several practical aspects that I think could now be improved, on both solids and wastewater operations.

¹³ <http://www.industrystock.com/html/Biogas%20plants/product-result-uk-6900-0.html>

1/. Getting the maximum amount solids into a pulp digester. Drained coffee pulp is still around 80% water. The best way that I know of to reduce this is (once again) to make silage of the coffee pulp, (see files Baier and Houbron) and then feed in material that is already half way on to make biogas and make a slurry of it with liquid that is already in the digester. If you still have on file those NZ MAF brochures I sent you, the second one on design and construction shows a feeder tank set down in the ground beside the digester. Nowadays one would have a manure chopper pump on a long leg set down in the tank, rather than a conventional pump set on ground level half way to the digester. The daily increment of silage solids is dumped into the feeder tank and then the tap from the digester is opened and sufficient slurry is run out of the digester and down into the feeder tank. There is very little loss of methane from this exercise as most of the dissolved gas which comes out of solution is CO_2 and makes an anaerobic blanket over the slurry. Methane does not stay in solution like CO_2 does. Just don't fall in that tank, or life will be short! Run the pump in recycle mode for a few minutes to reduce everything to a fine slurry and intimately mix the bacteria into fresh feedstuff. The taps are then readjusted to pump everything back into the digester which then displaces an equal volume out the other side to waste. In this way one can build up solids to the limit of practical movement with a pump. It also speeds up the response of the bacteria to fresh feedstuff.

2/. When to add the lime and readjust the pH.

Coffee waste water if left to itself will in just a few hours ferment all its sugars to alcohols and then on to a mix of volatile fatty acids. Houbron has the list. The resultant pH is pretty firmly fixed at 3.8 This will throw all the pectin fragments out of solution and they will float to the surface as a loose kind of "porridge", which has future possibilities. However, as mentioned elsewhere, Spanish speaking Latin America wants to treat the water with slaked lime (Calcium hydroxide) before it leaves the factory. This means that the pH never gets below about 5, and the mucilage precipitates as a calcium crosslinked polymer, almost like rubber, that is very hard to process on further locks up a lot of the potential biogas production. Someone needs to do a bit of work on this.

3/. Getting the right amount of gas when you need it.

Drying coffee is very weather dependant. A month of fine weather and no gas at all may be required. A month of wet weather and you want twice as much gas as the daily pulp increment can supply. This is where stockpiling the pulp as silage really pays off. By adding more or less silage feedstuff, with a time lag of 36-48 hours, it is possible to wind gas production up or down, by a factor of 2-3, just as you require it. Storage of energy as methane is expensive. Storage as acid preserved coffee pulp, ie. silage, is ridiculously cheap. [I would hope that once the factory management get attuned to the scope of this technology that they would supply most of their peak season needs with biogas made from the wastewater, and stock pile the pulp silage for use during the off season. For any energy source it's a lot more convenient to have it on tap all year round.

4/. Using biogas right across the energy spectrum.

Burning biogas just to dry coffee is a waste. Generate the factory's electricity needs with it and then use the waste heat from the generation plant to dry the coffee. Generation plant designed to run on natural gas is available off the shelf and relatively cheaply because it is mass produced. A major saving can also be achieved by converting some of the company vehicles to CNG dual fuel status. The best ones to convert are the ones that work close to the factory and in the fields. Automobile CNG tanks do not hold a lot of fuel, so vehicles used on long trips are not so good.

5/. Get the message across that fresh mucilage does not make much biogas.

Coffee mucilage is indigestible by methanogens. Putting mucilage raked off the water ponds, or crosslinked to hell by calcium ions, into any kind of digester will only dilute down the concentration of the slurry in the digester to no positive advantage. Its best use is as compost, where aerobic bacteria can break it down. However, as already stated, it does have a lot of linked sugar molecules and methyl attachments, and given the time factor of stockpiling pulp as silage, a lot more of these sugars can be decoupled from the oligo-saccharide polymers and produce at least some more gas, than can be got from fresh pulp.

According to the text books, the slowest of the four stages is the hydrolysis stage. (Ref.) This is what happens in the ensiling process, when there is plenty of time for it to ferment to completion uncouple most of the sugars and speed up the methanogenesis, to the point where a much smaller digester can handle a lot more solids a lot quicker. (Ref.)

This exercise started out to be an analysis of your spreadsheet on biogas possibilities at Finca Puebla. However, more inane ramblings, I got side tracked again and will have to start afresh on your spreadsheet. Anyway I did realize from that, that sending you the Baier refs was (What we say in English) "Sending coal to Newcastle" Sorry about that. The Google Earth reference you gave me puts the factory site out to the North east of Mexico city rather than the Southeast as the Santa Rita Plateau address would indicate. Anyway the resolution for most of rural Mexico is so poor its hard to make out much detail at all. Obviously the American CIA doesn't think there will be any Military threat from Mexico.

Ciao! CkenC.

---oooOOOooo---